

IoT Based Health Check-Up System

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Abstract: - Telehealth and telemedicine area unit seeks the intense importance in today's era by each country with the arrival of the novel corona virus and other critical diseases. Therefore, in this phase, an IoT based health check-up system is the best idea to deal with such pandemic. The developing research sector especially in the field of medical sector is Internet of Things (IoT) which is new revolution of internet. With the rise in application of latest technology, this remote health check-up system has evolved in such a pace encouraging telemedicine and telehealth. IoT based surveillance of health not only assist regular check-up of patient at their own locality which prevents the spread of disease also, it will help in getting a proper diagnosis of the health condition, even if the doctor is far distance away. In this research paper, a mobile functional checking framework is shown, which is able to screen the patient's weight, height, BMI, heartrate, systolic-diastolic blood pressure, temperature, and oxygen saturation of the patient. We are proposing a health check-up device to screen the patient's basic six vitals which is generally checked by every doctor and store the patient information's in firebase utilizing Wi-Fi Module based remote correspondence. A remote health check-up technique using IoT is proposed solution which facilitates to access these data stored in firebase using IoT platform and based on these data received, the diseases can be diagnosed by the doctors from a distance.

Key Words: —Health, Check-up, IOT.

I. INTRODUCTION

We human beings are living in highly toxic world where lifespan is reducing day by day and the number of diseases in the world are increasing rapidly. Health is usually a significant concern in each growth of the society, as humankind is advancing in terms of technology. Ongoing pandemic has proven that health is wealth and health care has become of major importance. In such areas where pandemic situation is worst, rural areas where medical facilities are not available it is the best time to use technology like remote health monitoring technology through which patients can be diagnosed by physician from urban cities. Therefore, Internet of Things (IoT) based health check-up system is the current solution for it. The arrangement of remote based health check-up system allows the treatment of patients outside default clinical setting (e.g. - Office, villages, home etc.), which expands access to human services and bringing down the travelling expenses of the patient. The main objective of this project is to design and implement a smart patient health check-up system that uses Sensors to check patient health and uses internet to inform doctors about patient's vital parameter.

Some more objectives for developing health check-up systems are reduction in health care costs by avoiding Physician office visits, hospitalizations, and travel expenses of patient. This practice will also prevent spread of pandemic. Doctor will examine six basic vital signs of human body for diagnosis of diseases. The sensors are linked to a microcontroller to check the vital parameters, which is thus interfaced to an LCD screen and additionally, remote association with sharing data over firebase. The framework measures weight, height, BMI, heart rate, blood pressure, body temperature and spO2 level and data uploaded on firebase and furthermore indicates parameter of patient live in the web. Firebase aimed at a real-time database. Additionally, it also offers Backend-as-a-Service. It is a cloud-hosted database with NoSQL. Firebase, ensures guaranteed synchronization between user data. In most of the rural areas, the medical facility would not be in a very hand reach distance for the natives therefore usually the individuals do not give much importance to any kind of minor health issues, which shown in early stages by imbalance of vital elements like BMI, body temperature, Blood pressure, spO2 and heart rate etc. Once the minor health issue becomes the major one and the life of the person is endangered, then they take medical assistance, which can cause an unnecessary waste of their earnings. This also becomes important when certain pandemic is spread in an area and traveling of a doctor to that particular area becomes difficult. So, to save lives of people and to avoid spreading of a

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disease a smart sensor can be given to patients, who can be monitored from a distance. In this paper section, II tells of the proposed system, section III tells of sensors used, section VI tells of the IOT server, section V tells about experimental setup including the circuit and later conclusion is given.

II. PROPOSED SYSTEM

The main objective of this project is the design and implementation of a patient health check-up system. Fig.1 shows the overview of the proposed system. The sensors are embedded on device for measuring various parameter. These sensors are connected to a Node MCU(ESP8266), which calculates the values of all the five sensors. These calculated values are then transmitted through an IoT wi-fi module over firebase. From the firebase the values are then accessed by the doctor at any other location. Thus, based on the weight, height, BMI, temperature, heart rate and blood pressure values the doctor can decide the state of the patient and suggest appropriate treatment that can be taken.

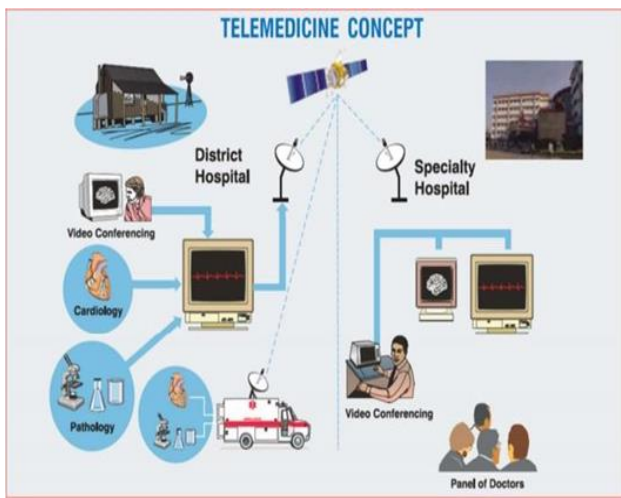


Fig.1. Proposed System

III. SENSORS

There are several sensors used for measuring different parameters. Following points discuss about them:

- Load Cell is used to measure body weight of patient, which converts the pressure into an electrical signal. This sensor is followed by HX711 (24-bit ADC) which convert Analog signal received from load cell to digital signal.

- Ultrasonic sensor (HC-SR04) is used to measure height of patient, which calculate the range through the time interval between sending trigger signal and receiving echo signal.
- Blood pressure sensor is used to measure systolic, diastolic pressure and pulse rate of patient.
- The MAX30100 is a pulse oximetry sensor. It consists of red light and infrared light; oxygenated blood absorbs more infrared light and passes more red light while deoxygenated blood absorbs red light and passes more infrared light.
- Temperature sensor (DS18B20) is 1-wire digital thermometer, which provides 9-bit to 12-bit Celsius temperature, which is converted, to Fahrenheit by micro-controller.

IV. IOT SERVER

At whatever point the patient goes for check-up, the system measures all the vital parameters and the data is uploaded on firebase as well as display on LCD. Device is connected to hotspot and data is upload on database. Firebase shows the real time data uploaded by device named as ‘device 1’. When you click on device 1, it will display all the parameters as shown in table I:

Table.1. database structure

| Sensor data | Datatype |
|------------------|----------|
| Patient ID | Int |
| Weight | Float |
| Height | Float |
| BMI | Float |
| Pulse rate | Int |
| Body Temperature | Float |
| Blood pressure | Int |

V. EXPERIMENTAL SETUP

The body temperature, weight, height, BMI, blood pressure and pulse rate sensors are monitored and initially displayed on LCD as explained in the flowchart in Fig.2. The values from the sensors is stored in the database. The circuit diagram of the system is also given in Fig.3.

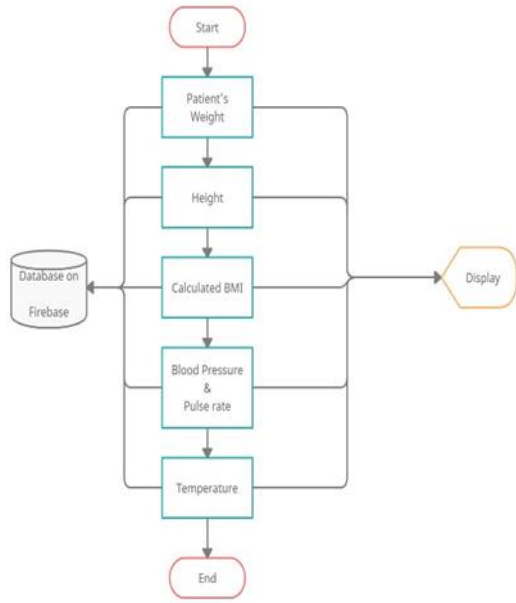


Fig.2. Flowchart

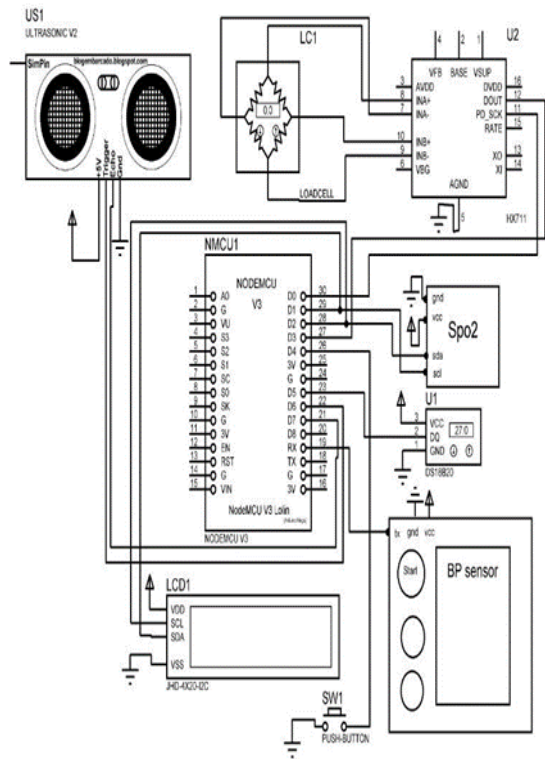


Fig.3. Schematic diagram of system

VI. CONCLUSION

The Internet of Things considered now as one of the practicable and best solutions for any remote data tracking purposefully in the field of health monitoring. It facilitates that the individual essential parameter data is secured inside the cloud, stays in the hospital are reduced for conventional routine examinations and most important that the health can be monitored and disease diagnosed by any doctor at any distance. In this paper, an IoT based health check-up system was invented. The system keeps track of body temperature, pulse rate, weight, height, BMI, spO2 and blood pressure using sensors, which are also displayed on an LCD. These sensor values are then redirect to a medical server (Firebase) using internet. This data is then received by an authorized user with IoT platform. With the help of data collected from the firebase, doctor will diagnose the disease and the state of health of the patient.

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