Healthcare Monitoring using Raspberry PI and IOT

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Abstract: Health is the most important which needs to be taken care of and should be of the highest propriety. Traditional Healthcare services are not mobile, expensive and also requires trained professionals so cannot be deployed in remote areas where there are limited facilities available so there is need to develop a system which can deployed and carries without any issues and will start recording basic health parameters which can be transmitted to the doctor with required credentials so that the patient gets treated without any need to travel and can also help during emergency as user and the doctor need the required credentials the device is also helpful during covid times when it is advised to stay at home and also maintain social distances avoiding gathering of patients at one place so the device can also be deployed at hospitals.

Keywords: Raspberry pi, IOT, Healthcare.

I. INTRODUCTION

The Internet of Things is a rising topic of social, economic and technical significance... Internet have things is changing the world of Electronics as for example earlier in an weather observatory system the person needed to change the numbers displaying the temperature and other weather parameters manually but with the use of IOT he or she can change the number displaying the parameter setting in the office. IOT can be described as a set of devices which can interact with physical world, record the data, store and communicate with the devices and take decision upon analyzing and comparing the data with previously stored data. Real life example of IOT

Is Autonomous Vehicle which are able to navigate with the help of sensors and processor connected to each other? Home Automation includes Pet feeder, Remote control of lights, Automatic door look system to name a few.

The use of IOT is burgeoning and has been efficacious in almost every field. The use of IOT in health care is also rising due to its advantage like accuracy in data, Real time monitoring of patients and in Covid times the most important benefit of implementing was the contactless measuring of health parameters. The best example of IOT in healthcare is use of contactless temperature measuring sensor .In conventional health care undetected health problems can be avoided through IOT Technology as it monitors the parameters continuously and can alert the doctor if some aberrant behavior is recorded. The set of sensors at the users end will continuously monitor the patient and in case of an emergency the processor will immediately alert the doctor which will help in making a quick decision. The device which is being developed consists of sensors like temperature sensor, IR Sensor which will helpful for measuring blood sugar, oxygen sensor, heart rate sensor, camera module for interaction with doctor and Arduino which will process the data from the senor and will transmit it over the wife at the doctor end we have built a website on which all the health parameter will be displayed. During Covid times when it was asked to stay at home it was difficult for many paralyzed and old people to get the treatment they need so in such cases the device would be helpful as the patient will be able to communicate with the doctor without stepping a foot outside and waiting for longer hours in hospital. The other advantage of the device is that it prevents the hospital from crowding as the device will be permanently installed at the patients place whenever the patients feel the necessity to interact with the doctor he or she just needs to connect the device to the internet and take the appointment at the hospital .The device is also beneficial for patients in the rural areas as in some areas where the healthcare facilities are not available

The patients' needs to travel km to get treated and also in tribal areas where the population is not more than few hundreds the local authorities can take this device and whole village can use it to measure basic parameters and interact with doctor

II. RESEARCH METHODOLOGY

The aim of the project is to make health care systems accessible to everyone and at affordable cost with the help of technology. In this project we are going to make the use of various sensors which will monitor the patients health parameters continuously and will record it in real time which will help the doctor in treating the patients and will also be helpful in emergency situation as the system will store the data acquired from the sensor and compare the data with the previously recorded one and will immediately alert the patient as well as the doctor if any aberrant behavior is noted which in turn will help taking appropriate actions in that golden time. In this project patient health and healthcare cost is reduced.

III. LITERATURE SURVEY:

- To study the existing models of healthcare we have gone through a number of research paper previously published.
- According to the observation from the research paper A. Murray and Khambete N.D., "National efforts to improve healthcare technology management and medical device safety in India," 7th International Conference on, IET, presents the planning of modern medicine, effective and safe use of healthcare technology as essential for any healthcare system. Concerns about medical equipment care have been raised up. There is need to discuss the progress of health care system, In this paper significant progress in the implementation of the healthcare system is proposed. Also the lack of medical equipment safety measures and the protective steps that need to be taken care to improve the quality of healthcare is discussed.
- Then in4 Y. T. Zhan et al. presents the implementation of telehealth systems for elderly population and discussion on various chronic diseases and its importance. They discussed in detail about wearable technology for remote health care system
- In D. Mahesh Kumar, presents health systems based on wireless sensor networks. The wide range of benefits of wireless technology for the medical staff, patients and the continuous monitoring of the community, early detection of abnormal situations and potential knowledge found in the past data inserted all the information collected. The system helps the health care staff to control the complete state of the patient in a separate, real-time and great way through the network can reach every node of the patient at any time as long as the network terminal is available. The patient sends a set of sensors to collect their body parameters. The medical staff evaluates the overall condition of each patient and checks the collected values of the nodes.
- Sampada Sathe and Alok Kulkarni Health care applications of the Internet of Things: A Review" International Journal of Computer Science and Information Technologies paper attempts to evaluate and understand the application of IoT in personalized care for the realization of excellence in health care costs within reasonable limits.
- Here it describes how IoT's functions and how to use it in the use of remote sensing technology and wireless technology to achieve health care requirements.
- In the international journal of advanced research in computer and communication engineering, By sudha G , Iswar S , Jagadeesh P, Janani V M. presents the non invasive technique to monitor the blood sugar levels avoiding the pricking on a daily basis using Arduino and ir sensor.
- According to the observation from the international journal of scientific academic research by authors Navid bin ahmed , Shazzad hosain, Shahriar Khan. Presents the concept of measuring blood oxygen sensor, Max 30100, was used with Arduino.
- Through surveying another research paper by Chandini unni krishnan, srishti pandit, International research journal of engineering, We found that a set of sensors was used to access the data which was processed by Arduino for measuring different health parameters.
- To improve upon the existing connectivity. We plan to use Django framework for web development of the sensor data which we are going to process on the Raspberry pi
- The block diagram show various sensors which will be deployed at the users end and are connected to Arduino which will process the data from the senor and will send it to the doctor.
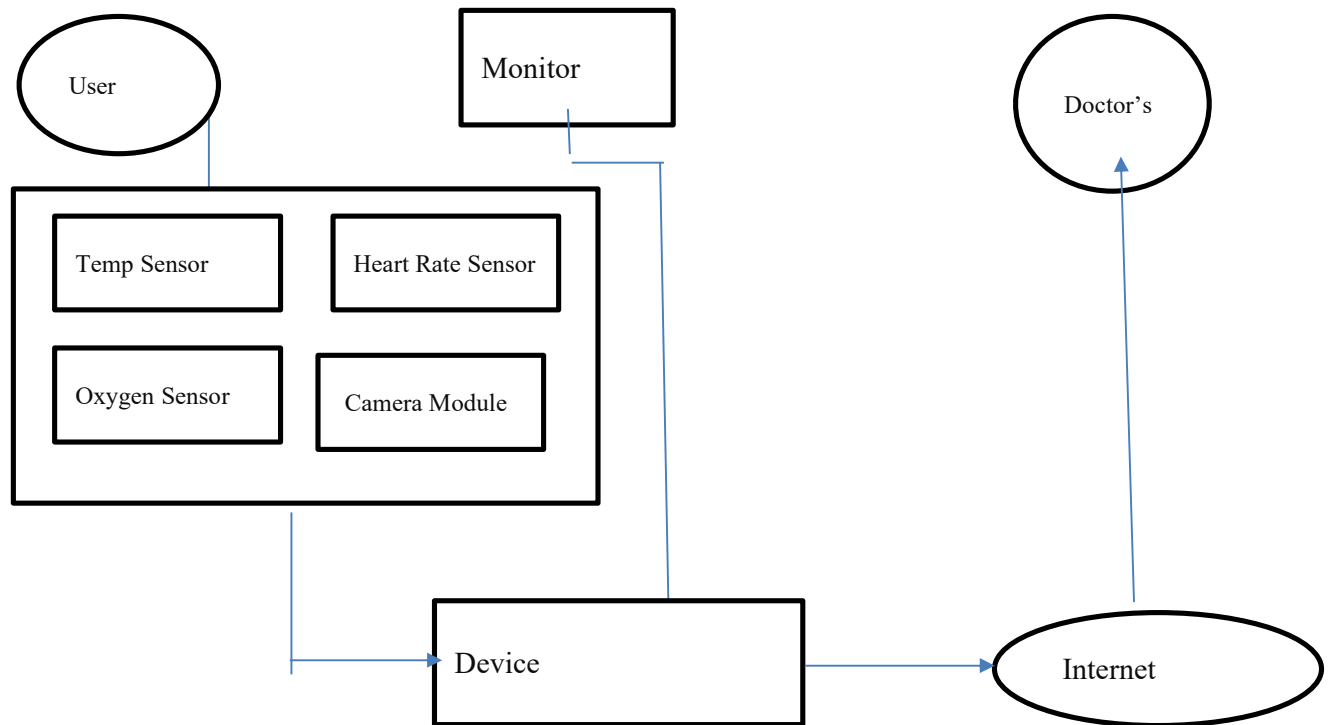
Fig. 1 Block Diagram

The project can be divided into two parts for the purpose of simplicity

1) The hardware part and

2) The software part

The hardware part:

The hardware part the project consists of various sensors like the temperature sensor, the oxygen sensor, Heart rate sensor, Blood sugar and the cholesterol measurement sensor. As the aim of the project is to healthcare services to the patients who does not have access to the sophisticated services and can be deployed in the rural areas considering that we have try to minimize the cost of the project. The Sensors and devices were chosen based on the following features:

- The temperature sensor that have been chosen is the DS18B20 which a low cost, highly accurate sensor which is also water proof that gives the ability to measure temperature in wet conditions.
- For measuring amount of oxygen in the blood and heart rate we are using MAX30100 sensor which is again a low cost sensor with high accuracy.
- The camera module has been attached at the user side because of the patients wants to discuss some points with doctor so it will be helpful

Fig. 1.1 . (Raspberry Pi)
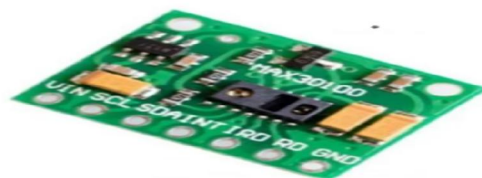
Fig. 1.2. (Heart Rate sensor MAX30100)

Fig.1.3. (Temperature Sensor DS18B20)

In software part

We have used a django framework to build up a front end of the device. Now on the doctors side we have built a website with the help of which he/she can easily get all the details about the patient's health. HTML was used to create a webpage. A super user who has authority to make changes in the django framework can make changes at any point. A super user or an admin has the authority to grant access to the other users to login. Access restrictions can also be applied as needed. The proposed website will have the parameters of the heart rate sensor and temperature sensors.

IV. RESULTS AND DISCUSSION

Each patient will be assigned an id which will be unique and as per the parameters of the patient medicines can be recommended automatically on the users side. For example if the heart rate is high then a medicine would be recommended to elevate that issue, if the patient has a high temperature then a common fever medicine could be recommended. The figure 2.1 is the template for the website which can be accessed by anyone with the authority to login, it will display the readings obtained from the sensors and based on the average parameters of a healthy individual we can add common medicines for abnormal parameters.

. **Fig.2.1** Website which can be accessed by the medical staff

V. FUTURE SCOPE

In this modern world everyone is racing against time so and in the process achieving goals health is neglected and when it comes to diseases like diabetes and in country like India with a population of over 1.3billion people 72.9million people it becomes important to check it regularly but the traditional method includes piercing which can result into infection and is also painful so we are working on the technique of non invasive blood sugar measuring technique which reduces pain and does not result into pain.

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