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Patient Healthcare Monitoring System Incorporating Internet of Things

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Abstract- *In last few years, in real time scenario many people are away from hospital location. They may be aged patients, independent living person etc. These independent patients have to be dependent on self healthcare monitoring system to take care of their health. However, a patient needs to be monitored even after getting outside of the hospital for some days until the patient gets cured completely. Such an aim could not be achieved using zigbee since it is a short distance communication and is not able to update the details frequently because of its low processing speed. Hence the transmission medium is replaced by Internet of Things which is capable of transmitting the data at a longer distance and at a high data rate. It also auto updates the data for every second if we needed. The scope of the work is extended in such a way that after receiving the health parameters of the patients, the doctor is able to alert the patients to take necessary treatment and this is done using Internet. This paper focus to identify patient's in critical situations at the time of their emergency. A quick intervention coordinates to specialist in nearby healthcare centre.*

Keywords— *Internet of Things; wearable device; sensor; health monitor;*

I. INTRODUCTION

In current scenario increasing number of healthcare sensing devices monitors patient's health. During emergency time, the patient's are monitored by their health devices in self monitoring manner. Researchers are performed using aged patients disease data worldwide. The patient uses portable devices that collect information to processes from wearable devices. The patient data's are collected by wearable device used to predict an increased harmful patient health condition and alert specialist providers based on intervention might be needed. These patient histories are stored from various environments.

In hospital, there are providing continuous patient healthcare monitoring. Their Heartbeat rate, blood pressure, body temperature are continuously monitored the patient health condition. There is no conveyance to check the parameters when they come back to home. And hence there is a chance that the disease may return again. The emergency responses are delivered as output based on critical of patient. Internet of Things coupled with mobile devices, are applicable to reinforce self observation of sickness while not the necessity of travel for expensive medical treatments. This encourages most of the old age independent patients and physically challenge patients to self monitor themselves without depending on others.

These systems targets the transmission of multiple information from a hospital information data using communication technology to make interactive model that links patients medical wearable device to Smartphone's of family care givers to enhance the standard of patient self-care by motivating patients to adopt healthy behaviors' by increasing independent monitoring without others support. This could enhance the standard of patient self-care monitoring. There are many patients in the world, whose suffers without appropriate medication by the hospitals. With updated new wireless IoT oriented technology solutions, remote monitoring of patient is possible rather than visiting the healthcare environment/ hospitals. To the age patients or disabled patients, different kinds of sensors that are connected to the body of a patient can be used to get health data knowledge firmly securely, and data can be collected analysed and sent to the server using different transmission media through the Internet.

II. LITERATURE SURVEY

The main goal of this paper to the exponentially growing healthcare costs coupled with the increasing of patients in receiving care in the consolation of their own homes have prompted a serious need to revolutionize patient healthcare system. The existing work lacks flexibility, scalability and energy efficiency. This study address this challenge by augmenting healthcare system with inexpensive but flexible and scalable pervasive technologies that long term remote health monitor. The Pervasive Patient Health Monitoring is based on integrated cloud computing and Internet of Things technologies. To demonstrate the suitable of the proposed infrastructure, a case study for real- time monitoring of a patient suffering from heart failure using ECG is presented. The experimental evaluation of the proposed Patient Health Monitoring is a flexible, scalable and energy efficiency remote patient health monitor system. The increased use of mobile technologies and smart

devices in the area of health caused impact on universe. Health experts are increasingly take the advantages of technologies brings together generating a significant improvement in healthcare monitoring system in clinical settings and out of them. The more number of users are being served from the advantages of mobile health application and healthcare support to improve, help their health. The applications have a major for these users, so intuitive environment. The Internet of Things is increasingly allowing devices connecting to the Internet and provides information of patient health status. And provide information in real time scenario to doctor assist. It is clear that diseases such as heart, pressure among others are remarkable in the world problem. The aim of this article is to develop an architecture based on ontology capable of monitoring the health and workout routine recommendations to patients.

In this paper a patient healthcare monitoring system with mobile phone and web service capabilities. It provides end to end solutions. Specifically, physiologic parameters are including respiration rate , heart rate are measured by sensors and recorded by a mobile phone which presents the graphical interface for the user to observe his/her health status more easily; it provides doctors and family members with necessary data through a web interface and enables authorized personnel to monitor the patient's condition and to facilitate remote diagnosis; and it supports real-time alarming and positioning services during an urgent situation, such as a tumble or a heart attack, so that unexpected events can be handled in a timely manner. To meet the requirement of emergency situations, a Wi-Fi based localization method was proposed for indoor environment. Experimental results showed the stable performance of the proposed Remote Health Monitoring system. The main limitation was the system was capable of only real-time monitoring of the patients status, not professional analysis and instruction.

The health care monitoring system is performed using zigbee as a transmission medium. The transmitter section was designed using Arduino and the receiver section was designed using Raspberry-pi kit. It is mainly deployed to monitor a patient under hospital environment only. The data transmission is the main role played in this case. In zigbee any problem occur compliant home appliances replacement cost will be high. Like different wireless systems, zigbee based mostly communication is liable to attack from unauthorized folks. The coverage is restricted and thus cannot be used as outside wireless communication system. It may be utilized in indoor wireless applications. The coverage distance is very low in the case of zigbee and also possess low data rate. This doesn't purpose that the factor should be physically connected to the web.

Patient healthcare monitor represent most attractive application areas for the IoT. The IoT has the potential to offer rise to several medical applications like remote health observance, chronic diseases, and older care. Compliance with treatment and medication at home and by healthcare providers is another important potential application. Therefore varied medical devices, sensors and diagnostic and imaging devices are often viewed as good devices or objects constituting a core a part of the IoT. IoT based care service area unit expected to scale back prices, increase the standard of life and enrich the user's expertise. From the attitude of healthcare suppliers, the IoT has the potential to scale back device time period through remote provision. IoT provides for the efficient scheduling of limited resources by ensuring their best use and service for patients. Ease of cost-effective interactions through seamless and secure connectivity across individual patients, clinics, and healthcare organizations is an important trend. Up-to-date healthcare networks driven by wireless technologies are expected to support chronic diseases, early diagnosis, real-time monitoring, and medical emergencies. Gateways, medical servers, and health databases play vital roles in creating health records and delivering on-demand health services to authorize stakeholders. The use of wearable device for observation physical health aspects of dementedness patients can benefits formal home-based care, by providing formal caregivers with further, vital important information concerning important, health-related events that will have happened throughout the non-visit home care hours. Wearable devices able to automatically recognize the user's activity state without the user pressing any button to mark the start or end time of the activity.

III. EXISTING ISSUES FROM LITERATURE SURVEY

From the above literature survey there are many techniques to be incorporated and issues to be overcome. There are still many future improvements for self-monitoring healthcare devices are required since communication gap for data transmission rate is very high. In hospitals, where patient's status needs to be regularly monitored, is usually done by a database administrator or other paramedical staff by constantly observing different parameters for example, Heart beat rate, Body Temperature, Blood Pressure and so on this level becomes tedious after sometimes.

Hence it can cause problem, there are many researchers have attempted before to solve it in different ways, but the earlier methods in several, SMS will be sent using GSM. It will be used to send patient's data to specialist. Moreover, in the earlier cases the history of the patient cannot be displayed, only current data is displayed. The large amount of patient data's can't stored in server. If suppose group of patients see the data at a time server becomes slow so they may be problem.

IV. ARCHITECTURE

Overcoming the issue, in existing system, based on literature survey, the PHMSIIoT architecture is proposed. In this architecture the usage of wearable device healthcare monitoring of recent technology is incorporated in IoT environment. These wearable devices are used to monitor pulse rate, heart rate, sugar, body temperature etc from every individual patient. The outputs of all wearable devices are sensed by Bluetooth sensor.

The input phases are as follows

- Multiple wearable devices from every individual patient
- Sensor to sense data from wearable device
- Sensed information from sensor fed into Mobile of individual patient
- Mobile to gateway supply of information
- Gateway to cloud storage

The data collected from sensor devices are stored in individual mobile devices. The mobile app has the detailed medical related information about patients. Every individual patient medical report's are uploaded in through gateway. This information's are stored in hospital database for which user ID and password provided for the individual to the patients. So, the Middleware service are decomposed into different modules as follows

- *Collect Data Module*
- *Analyse Module*
- *Trigger Module*
- *Action module*

Collect Data Module

The collect data module encompass getting data from patient wearable device and update through a hospital database and filing system or storing all data, like medical records, historical from patients.

Analyse Module

The Analyse Module provides an internet interface for enabling users to manage all data regarding patients, medical records, and notifications through the Internet. These all the information data's are communicated in the Internet. By mistreatment such associate interface, doctors will analyse current patient's info collected by body based mostly notification that may inform them regarding vital conditions.

Trigger Module

The Trigger Module visualizes current patient's information collected by emergency notification that will inform critical condition message sends to doctor. A doctor will produce a trigger to identify his/her patient conditions.

Action Module

The Action Module present if patients in critical condition they immediately sent emergency notification to specialist doctor (example ECG specialist, BP specialist). The scope of the work is extended in such a way that after receiving the health

parameters of the patients, the doctor is able to alert the patients to take necessary treatment or take necessary prescription message sent to patient. A quick intervention coordinates to specialist in nearby healthcare centre.

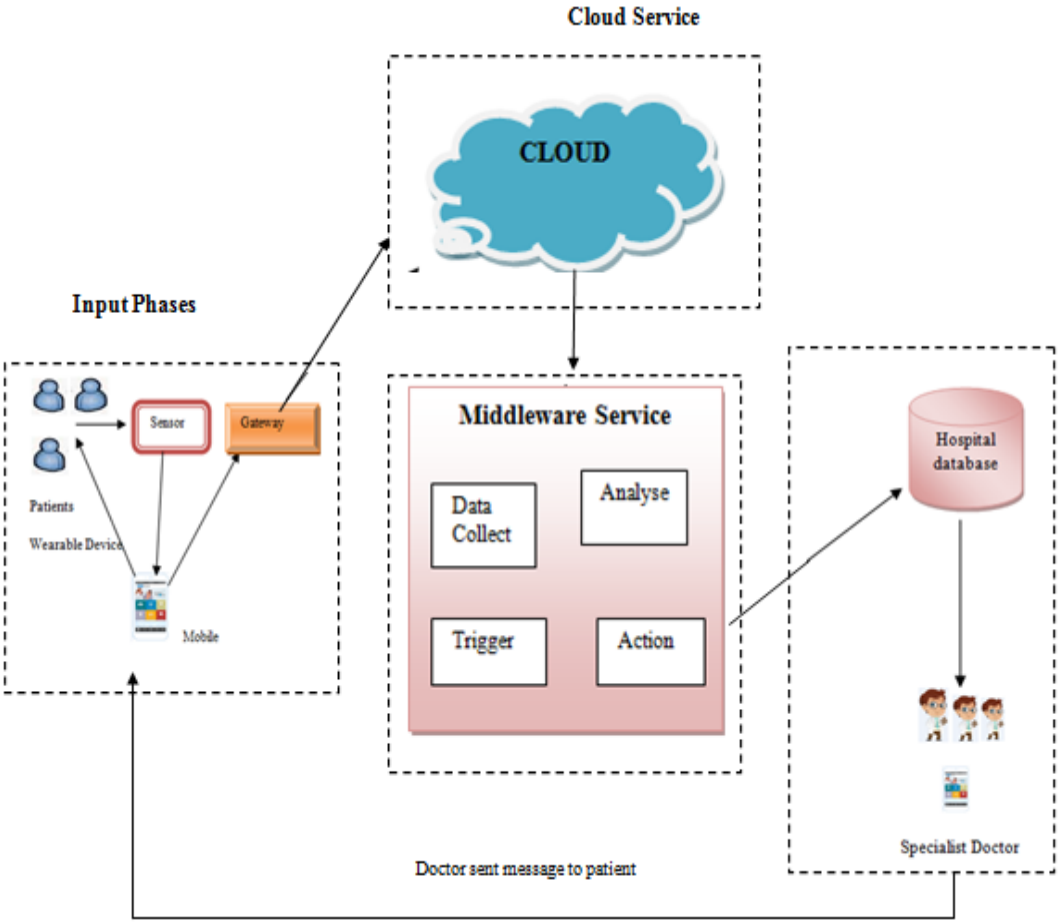

Fig 1: PHMSIIoT Architecture Proposal

V. PHMSIIoT PROPOSED

The patient's healthcare parameters are monitored using wearable device and the data is transmitted to the medical specialist through the Internet. This system is able to monitor a number of patients details are simultaneously even after they got discharge from hospital. And also auto update the patient details to the doctor through Internet. The patient's data are transmitted through Internet and the specialist is able to alert the patients or their respective care takers if the patients need immediate medical attention. The IoT is able to serve as a secure and communicate for long distance transmission medium through the Internet.

The health parameters of all the patient details are updated to a specific website assigned only for IoT and is checked by the doctor frequently. It also auto updates the healthcare parameters for patients every time if we needed in the specified website. An alert message notification is shipped to specialist doctor. If the patient health condition is critical doctor sent to prescription message or take necessary treatment in nearby health center. These all the information communicate through only Internet.

VI. RESULT AND DISCUSSION

Heart Beat rate monitors are used as important tools for the measurement of patient health. Because of this, portable heart rate monitors have become the most common method to measure the patient condition every second. Heart rate monitors has ranging from 60-100 bpm.

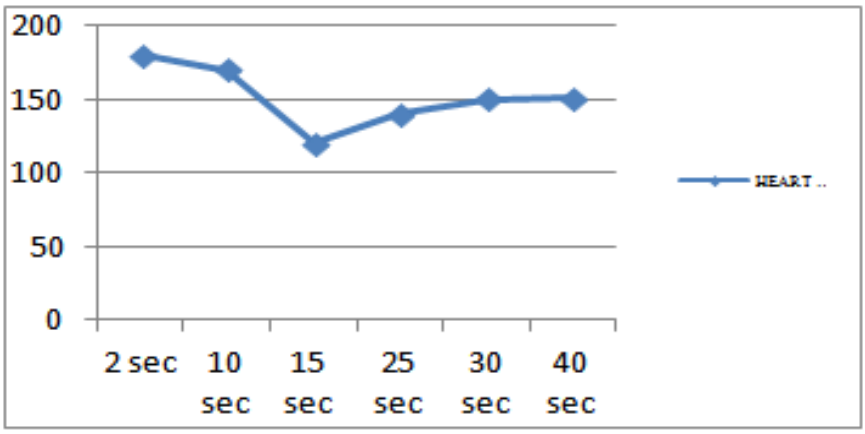

Fig 2: Heart Beat Rate

The sugar value ranges between 72 to 108 mg/dL as measured by fasting up to 140 mg/dL 2 hours after eating.

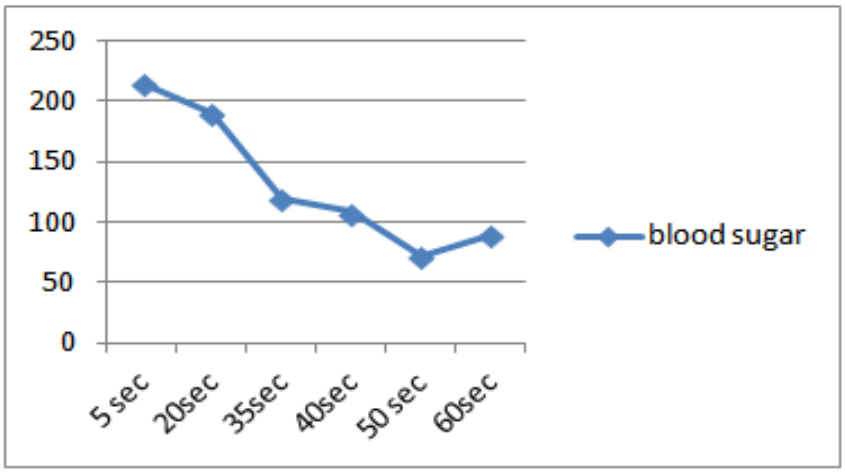

Fig 3: Blood sugar

The Body temperature for human vary is 36.5°C to 37.2°C. A patient's temperature could also be alerted attributable to abnormality exposure to hot or cold. These all information's are show the sensing element and collect the knowledge hold on in hospital information.

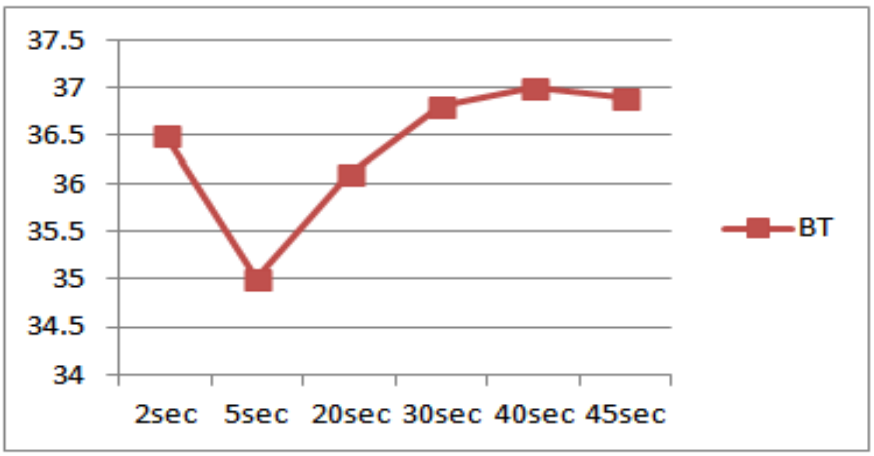

Fig 4: Body Temperature

The performance analysis for patient is done from the reading of individual graphs.

VII. CONCLUSION

IoT based approach has been proposed many patients away from hospital location so they could not easily take care of their health. Sometimes patient going outdoor they could not monitor their health. So, overcome the issues we using wearable device. Wearable device mostly used to monitor the patients details each and every second. This device monitors the patient health. We now face the challenge to provide health promoting applications for these devices.

In this proposal current trend of self monitoring healthcare device using Internet of thing technology is incorporated to benefit independent, aged patient. The system collects and monitors multiple patients' details at the time of emergency. It collects all patients details and it analysis which patient in most critical condition. The ability to live activity through a spread of ways can alert patients to assume large management in their healthcare.

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