Patient Health Monitoring System Using IOT

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ABSTRACT

Now-a-days Health care Environment has become technology oriented. Humans are facing a problem of unexpected death due to the reason of heart attack, which is because of lack of medical care to patient at right time. Therefore, we are developing project to avoid such sudden death rates by using Body Health Monitoring. In this system, a patient will be carrying hardware having sensors and android phone application, the sensors will sense the body temperature and heart rate of patient and this data is transferred to android smart phone via Bluetooth/Wi-fi. System has the cloud database that stores all information about patient's health and the Doctors will prescribe medicine using this information stored on cloud. Device even allows patient to move freely and can monitor the patient continuously. The android phone will be containing an application that will detect the heart attack according to the received data from the device and if any abnormalities are found regarding heart attack message will be send to patient's doctor, relatives and hospitals. The SMS contains patients situation and location (via GPS) to provide urgent medical attention.

Keywords: Node MCU 2, Internet of Things, Cloud Computing, Heart rate sensor, Body temp sensor, Healthcare system, Android, GPRS

I. INTRODUCTION

Hospitals always need better management. The database of all patients should be handy enough. In addition, there should be data prevention. Also the patient data should be kept private in case. Healthcare is the most important concern of many countries in the world. Improving the lives of patients especially in the weaker parts of the society that include the elderly, physically and mentally disabled as well as the chronically ill patients is the major factor to be improved. In existing system, the data is recorded in the form of paperwork or on general storage server. But generally that data is accessible to all the staff and doctors. Hence, we are proposing a new way where patient and doctors able to communicate through mobile application and web application.

In hospitals, there are provisions for continuous monitoring of patients. Their heartbeats are continuously monitored. There is no provision to check the parameters when they return to home. Hence, there is a chance that the disease may return. Patient's data (temperature, heart rate, position) will be frequently measured and sent to server. Period of sending (say every 3 min) can be set. Monitoring person learns patient specific threshold. Say the regular body temperature

of a patient is 37.0˚c whereas one person feels feverish if his body temperature is 37.0˚c. By employing an averaging technique over a relatively long time, Observer can learn these thresholds for patients. Using Android Application in doctor's smart phone, doctor can view his patient's health status. When any of the parameter goes beyond the threshold value, he will get an alert notification.

Using Andriod Application in patient's or his caretaker's smart phone the patient can view his health status. Early detection and diagnosis of potentially fatal physiological conditions such as heart attack require continuous monitoring of patients health following transfer from hospital to home. Studies have shown that 30% of patients with a discharge diagnosis of heart failure are readmitted at least once within 90 days with readmission rates ranging from 25 to 54% within 3 – 6 months. In response to these types of needs, health-monitoring systems are being proposed as a low cost solution. Such a system consists of physiological data that stores, process and communicate through a local manner such as smart phones, personal computers. Such systems should satisfy strict safety, security, reliability, and long-term real-time operation requirements [2]. In the proposed system, we present a health monitoring system that uses the sensors for collecting data from patients, intelligently predicts patient's health status and provides

feedback to doctors through their mobile devices having android application. The patients will participate in the health care process by their mobile devices and thus can access their health information from anywhere any time. Today Internet has become one of the important part of our daily life. It has changed how people live, work, play and learn. Internet serves for many purpose educations, finance, Business, Industries, Entertainment, Social Networking, Shopping, E-Commerce etc. The next new mega trend of Internet is Internet of Things (IOT).Visualizing a world where several objects can sense, communicate and share information over a Private Internet Protocol (IP) or Public Networks. The interconnected objects collect the data at regular intervals, analyse and used to initiate required action, providing an intelligent network for analysing, planning and decision-making. This is the world of the Internet of Things (IOT).The IOT is generally considered as connecting objects to the Internet and using that connection for control of those objects or remote monitoring. But this definition was referred only to part of IOT evolution considering the machine to machine market today. But actual definition of IOT is creating a brilliant, invisible network which can be sensed, controlled and programmed. The products developed based on IOT include embedded technology which allows them to exchange information, with each other or the Internet and it is assessed that about 8 to 50 billion devices will be connected by 2020. Since these devices come online, they provide better life style, create safer and more engaged communities and revolutionized healthcare. The entire concept of IOT stands on sensors, gateway and wireless network that enable users to communicate and access the application/information.

II. PROBLEM STATEMENT

In today's social insurance framework for patients who stays in home during post operational days checking is done either via overseer/ via medical caretaker.

A. Related Work

The area of health in recent years has been rapidly integrating technology in the monitoring, diagnosis and treatment of patients remotely and in situ. Thus achieving to improve the quality of life of patients and greater traceability of information from them. Most studies reviewed point to a chronic disease monitoring in particular as in which are responsible for the first remote monitoring of vital signs and the second of a tele medical ECG system of a patient.
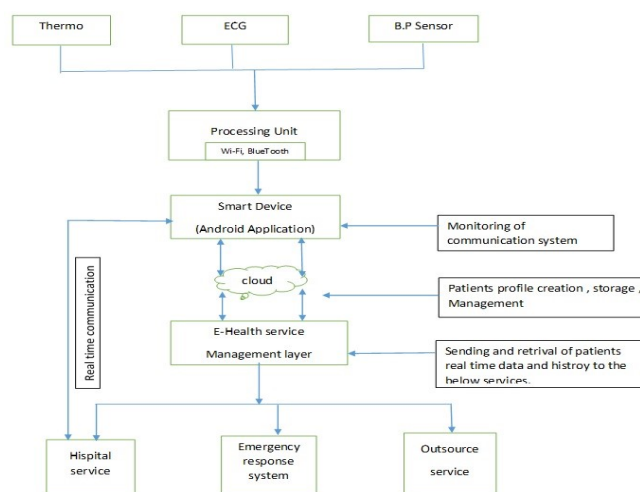
All these systems although quite complete is your scenario; include individual problems with regard to the treatment of some diseases that affect human being in the economic and social. Is a very important way to develop a comprehensive solution where no matter

what kind of disease, the type of check, the different units to be handled this can become a possible solution for sequential monitoring of these patients.

Other systems such as those proposed are fixed in the IoT bring advantages in terms of perception, transmission and application of information in the field perspectives of health and medical care. Enabling smart, an accessible and communication system based on IoT hosting segments such as: medical equipment, information management control medication of patients, telemedicine, mobile medical care, and personal health management, among others.

B. System Architecture

The Block diagram of the proposed system is shown in figure. The sensors Temperature, ECG and Heartbeat are connected to the node mcu board. The values from the board are given to the Web Server using Wi-Fi Connectivity. The Android Application installed in patient's smart phone can view the parameter values.

Processing Unit:

In our system, Node MCU Board is used. The microcontroller is connected with all other hardware units in the module. This module takes analog parameters from the sensors attached to patient, Process it and convert them in digital output. This module also contains Wifi connectivity device which sends the sensors converted data to the android smart phone.

In hardware we are using a LM35 (thermo) temperature sensor and a heart-rate sensor (ECG) sensor. With the help of that sensor analog result is generated and board will convert that analog result to digital output for

further processing. The LM35 series are precision integrated circuit LM35 temperature sensors, whose output voltage is linearly proportional to the temperature in Celsius (Centigrade). The LM35 sensor thus has an advantage over linear temperature sensors, calibrated in °Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient centigrade scaling. The LM35 sensor does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°Cover a full -55 to +150°C temperature range. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air.

III. IMPLEMENTATION

Patient monitoring system consist of 3 modules namely 1.web portal, 2.mobile application, 3.hardware. In the Web Portal, the actual User Interface of our project has been described in detail. The UI of our project consists of the 1. Admin's section, 2.the doctor's section, 3. The patient's section and 4. The medical section.

Now in the **admin's section** all the details about the patient is stated like (name, email id, phone number, address, etc.).So the patient's data is added in the list when you register from your mobile application.

Figure 1. Patients list

In the **doctor's section**, he/she has the whole history of the patient as well as if any problem occurs, the doctor is always there for help and one can also stay connected with doctor via SMS and the doctor can also check the patient's health graph status as to how there is an increase in the health. After checking the patient's

health graph if any improvement is needed the doctor prescribes the required medicines.

Figure 3. Patient health history

In the **patient's section**, if any problem he/she can convey a message to the doctor saying any health-related issues (if there is headache, stomach pain, fever, etc.) via SMS and then the doctor will revert with the appropriate medicines

Figure 2. Prescription to patient.

In the **medical section,** the medicines prescribed by the doctor will be gathered and will be delivered to the patient's home itself. When the delivery takes place, a notification will be sent to the medical section as to the delivery has been done.

In mobile application, this is only for the patient's side. In this application, a patient can register and then log in to the application via email id and password. After logging in the patient can contact the doctor and let him know what the problem is.
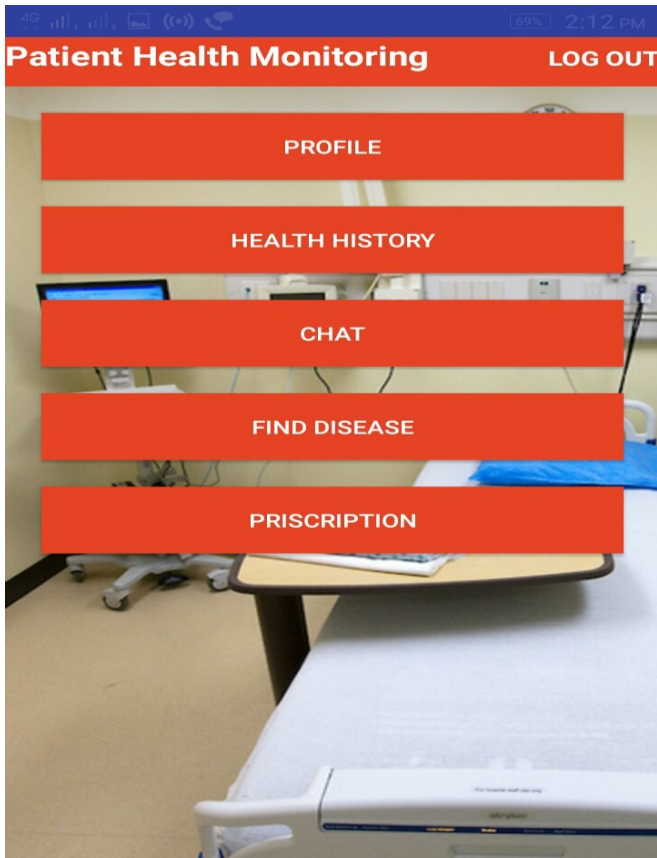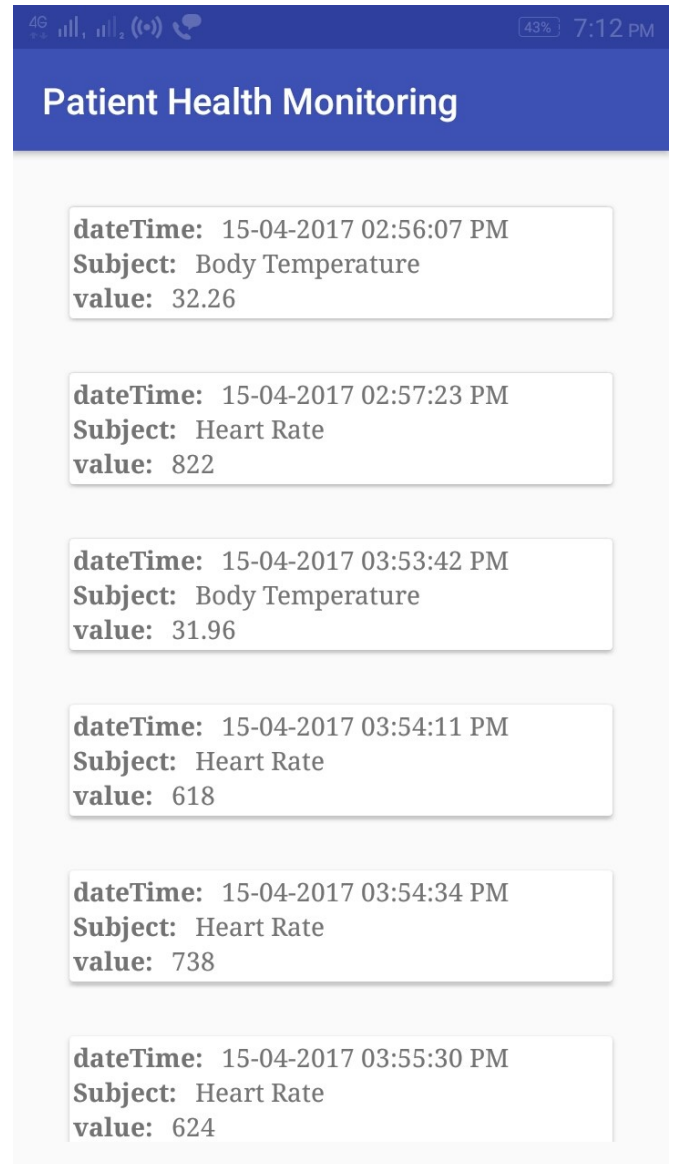
Figure 3. Mobile Application

Fig.Health-history in mobile application

IV. CONCLUSION

From this proposed system, it is conclude that Wireless sensor technology is emerging as a significant element of healthcare services. In this proposed system a mobile physiological monitoring system is presented, which is able to continuously monitor the patients heartbeat, blood pressure and other critical parameters in the hospital. The system is able to carry out a long-term monitoring on patients condition and is equipped with an emergency rescue mechanism using SMS.

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