SURVEY ON PATIENT MONITORING APPLICATION INTEGRATED WITH A MEDICINE BOX

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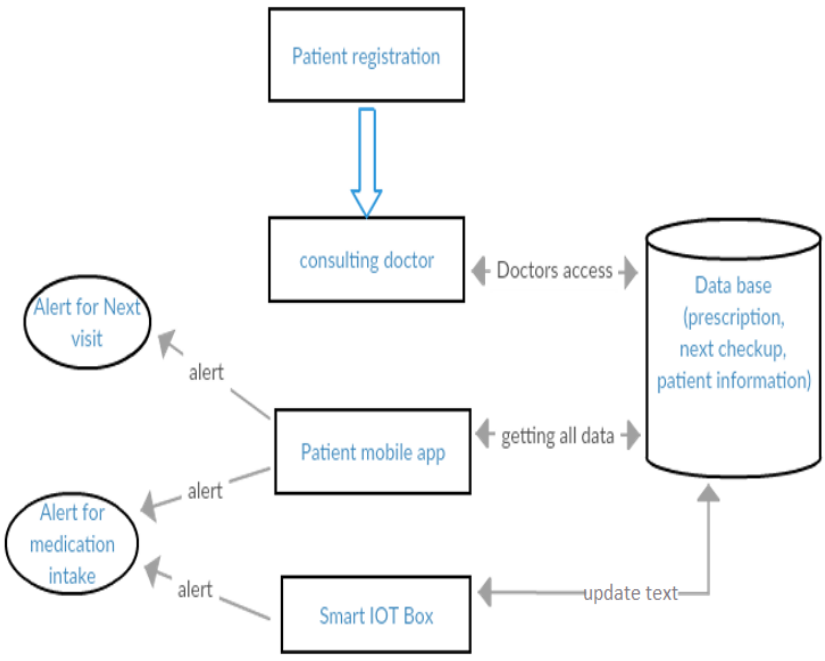
Abstract : In our day-to-day growing population, it has become very difficult to look after the health of patients who are suffering from long-term disease. Especially in case of elderly people who find it more difficult to look after themselves. So the proposed system has come up with a smart IoT box that assist the people to take medicine at particular time and it helps in notifying the patients regarding the checkup schedules and about the documents the patients must carry while coming for the checkups. Doctors can keep track of the patient's health regularly. Our idea is to develop a device that can assist the patient to take medicine and also when the box is empty it places an order to the pharmacy of the hospital to deliver the medicine to home.

I. INTRODUCTION

In our fast moving world, people neglect about their health. People find it difficult in remembering the medicines to be taken. Even today caretakers still uses the manual method to give the medication to the patients. Aim of the system which has been proposed is to shift medical checkups from hospitals to home. The system proposed helps the patients to take pills at the particular time. The negligence of the patient regarding proper medication, that is taking medicines at regular intervals taking overdose than prescribed and irregular checkups may lead to several side-effects and overcome medical negligence of the patients by alerting them frequently regarding the intake of medicines at proper time and intervals. It also helps in notifying the patients regarding the checkup schedules and the documents to be carried for the next checkups. The proposed model has an intelligent medicine box that gives alerts to patients for their medication at right time. It is connected to in internet to make timely updates about medicine to patient's smartphone through notice in android application.

II. SYSTEM ARCHITECTURE

The behaviour and working of "Patient Monitoring Application with a Smart Medicine Box" is shown below,



The system architecture of the proposed application model

Step involved in working of the system

- First patient registered with hospital management and consult the allotted doctor.
- Doctor analyse the patient and gives the guidelines and prescription to the patient and the prescription will also be updated to the patient database.
- The updated database is accessed through mobile app and smart device to give alert to the patient.
- The information about medicine intake will be updated to the patient database by smart device that will brief the doctor weekly once about the patient health.

III. TECHNOLOGY USED

The technologies such as Web application, mobile application, and internet of Things are used in the System to be implemented.

A. Internet of Things

The interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data. IoT involves extending Internet connectivity beyond standard devices, such as desktops, laptops, smartphones and tablets, to any range of traditionally dumb or non-internet-enabled physical devices and everyday objects. Embedded with technology, these devices can communicate and interact over the Internet, and they can be remotely monitored and controlled. Internet of Things has a strong backbone of various enabling technologies- Wireless Sensor Networks, Cloud Computing, Big Data, Embedded Systems, Security Protocols and Architectures, Protocols enabling communication, web services, Internet and Search Engines.

B. Web Technology

The methods by which computers communicate with each other through the use of markup languages and multimedia packages is known as web technology. In the past few decades, web technology has undergone a dramatic transition, from a few marked up web pages to the ability to do very specific work on a network without interruption. Let's look at some examples of web technology.

C. Mobile application

A mobile app or mobile application is a computer program or software application designed to run on a mobile device such as a phone/tablet or watch. Mobile applications frequently serve to provide users with similar services to those accessed on PCs.

IV. OBSERVATION

[1] The system works on remind and consumption functionality regarding the intake of medicines. The pill that has to be consumed pops out of the container at the particular set time thus reducing the confusion as to which medicines has to be consumed, which also reduces the burden of caretakers regarding the proper medicines that has to be given from time to time to the elderly people. It also sends a purchase order to the medical shop when the medicines are over. The alert sound that will be given helps the patient to consume the medicines at right time without fail and also without anyone's help.

[2] Monitoring the health of large number of patients suffering from various chronic diseases especially in the case of elderly people has become a tedious task with rapid population growth. The elderly people find it difficult to manage with medicines and the paper comes up with a smart system that monitors the dosage as well as their health. The Arduino board will receive continuous readings of the patient from smart sensor. Each pill container has its prescribed timing and it is interfaced with real clock time. When the time comes the alarm rings and reminds the patient for consumption. The system helps doctors in keeping track of large number of patients and their medical dosages as well as routines.

[3] The aged people are often the victims of chronic diseases and should be taking medicines without fail are also suffering from dementia and forget their daily routines of medication. Reminding about the medication schedule and monitoring the patients and updating of medicines from remote places by the doctor through web. The paper has been focused on to be beneficial for improved efficiency of prescribed drug. The system can be implemented with sensing and wireless modules and these should be secured so that the data containing information about health of the patient should not turn up corrupt. IoT plays a major role in communication between two devices. With the usage of messaging standard and communication protocol, the important messages regarding health can be transferred safely.

[4] The project is designed for the people who are under continuous medication and also for elderly people who should never neglect medication. The negligence can have serious effect on people with diseases like blood pressure, heart problems, diabetes, cancer, breathing problems etc. The medicine box is set up with a time table of prescribed medicines with a push button. RTC module saves

present time and notification time is stored in EPROM. At the time of intake the system generates a notification sound and LED display light on certain pill box. The system provides an effective and easy way for people who take medicines regularly at costs which are easily affordable.

[5] The proposed system is used for improvising to reduce risks regarding health and also costs in healthcare services by collecting, recording, analyzing and sharing large data streams efficiently. The system reduce the patient's efforts of visiting the doctor to every time to get blood pressure, heart rate etc. checked. The vision of the project is to provide proper and efficient medical services to patients by connecting and collecting data by health status monitors that would comprise of various information regarding patient's health. A better and efficient services to the patients can be provided by implementation of a networked information cloud. From this information the doctor can make use of the information and monitor the patient from remote places at any given time. A mobile application can also be deployed for the same so that the information can be accessed as and when required in case of emergency.

[6] The system is to provide help for the people suffering from chronic diseases in their medication routines to stabilize their health conditions. Consumption of the medicine at right time and dosage becomes crucial. The smart pill box is implemented with a camera that is based on medicine bag concept. A matrix code is printed on medicine bag interacts with pill box to perform remind and confirm functions. A family member or a caretaker's responsibility may also be reduced. Remind and confirm function can also work without internet, hence reducing the cost of implementation.

[7] The system is designed keeping in mind of the aged people who live alone on their own. Some of them who are suffering from disability find it difficult to take care of themselves. Any negligence or delay in medication will raise certain health issues. The medicine box can be used by the patients as well as caretakers to monitor the health. It is implemented with visual and audio notifications to alert the patient regarding the medicine intake and refilling of the box when the medicines gets over. A mobile application is also designed to send SMS and E-mail alerts to patient's caretaker. The box helps the patient or the guardian regarding the required pill quantity to be consumed and the exact time when it has to be taken.

[8] Many systems have been proposed to shift medication process from hospital to home environment. An intelligent medicine box implemented with sensors for monitoring and diagnosis of health is proposed here. The medicine box is wireless and integrated with a mobile application helps the doctor and patient to interact in closer manner. The system alerts the patients for medicine intake at the prescribed time. An alert will also be given to the guardian of the patient if any signs of negligence is shown. The doctor can have direct monitoring over the patient in the system. In the proposed system magnetic reed switches are used in operation. The operation is carried by means of stepper motors which have controlled signals given from Arduino.

[9] The monitoring system takes care of patient's personalized medication and also monitor the activeness of the patient and notifying if any vital signs is observed. An experimental idea of patient's health conditions will be given and the monitoring of environmental condition can be done based upon that. It is an open-platform based medicine box with enhanced connectivity and interchange ability for integration of devices and services. The box is integrated with communication capability enabled by zigbee and actuation capability enabled by flexible and wearable bio-medical sensors. SMS alerts will be given to the caretakers if any vital signs is found. Monitoring the conditions of the patient is continuously done with an IP address of WIFI. The daily activities of the of an elderly person is observed and based upon that, medication is given and keep track of their daily activities.

[10] The trend in IoT has brought a significant improvement in healthcare sectors. The combination of IoT-cloud plays a vital role in healthcare by providing a better way to support affordable and quality patient care. In the model, the system senses the patient's symptoms. The sensed data is collected and sent to the gateway via Bluetooth and then to the cloud server through docker container using internet. Thus the doctor can diagnose and monitor the patient from any location. Lifesaving application has been invented by the rise in in the field of IoT. The proposed system tells us how data is integrated with healthcare system based on IoT with the help of a Raspberry Pi and a docker container. The medical data is collected and stored by the Raspberry Pi through the attached sensors. The data received is transferred to the mobile application of the users. Thus the patients can improve their health based upon the data provided through the application.

[11] An in-patient monitoring system is being introduced here. The system implements two sub-systems: The physical states of patient with data acquisition and communication system on Zigbee technology and the monitoring by hospital control centre. The patients' movements and physical parameters are observed continuously. The information from data acquisition system is conveyed to the control centre monitored by hospital. The hospital database receives information of each patient from data acquisition system and updates to database. The doctor can analyse and diagnose the patient from the data that has been recorded continuously. A wireless sensor technology is used. For the convenient features it provides, patient can use it effectively. The real time system can record and monitor the physical state and movement parameters thus providing correct way for the diagnosis by the doctor. With an intelligent diagnosis software, early stages of the disease can be detected and helps the patient in-time and prevent the sudden demise of the patient. Zigbee can be implemented within short range of distance say about 200m and is best suited for in-patient monitoring.

[12] The system proposed is implemented with three parts: a smart sensor, a mail processing unit and the network communication unit. The system gathers bio-signals in real time: analyze those, display and store the data. The doctor at a remote location can access these data, diagnose it online and update the data for further diagnosis with the internet. As it is easy to use, cost efficient

and provide satisfying functionalities, people in rural areas and towns can make use of it. As the healthcare facilities is getting costlier each day, reliable solutions has to be found so that medication procedure can be relocated from hospital to home environment. The monitoring process is shifted to home environment with reduced cost and also in more reliable manner [12].

[13] Medicines are the basic remedy for the prevention and curing of almost all the diseases. A proper medication can cure many of the risky diseases. Improper intake of medicines can have side and adverse effects. The system helps in overcoming the negligence regarding the intake by providing intimation that is alerts about the right medication to be taken at the prescribed time. A buzzer and LED are implemented to provide audio and visual alerts respectively. An E-mail will be also sent to a caretaker or a family member to remind the patient in case if it is forgotten despite of the alerts given. A report of patient's weekly intake of medicine routine is sent through mail to the concerned doctor.

[14] In the system, the readings from the Arduino board is sent to the database via ESP8266 module and this data stored in the servers can be accessed by doctors and the registered patients. The system helps in independently monitoring the patients' health all by themselves and IoT system gives direct alerts to the concerned medical assistants at the hospital. A mobile application can also be created for efficient personal monitoring system. The data can be retrieved and information from the user and also the database can be accessed through mobile app and user can keep track of medication in an interactive way.

[15] The system is designed to help elderly people who are under continuous medication procedure. It helps them in taking medicine in an easier manner without any possibility of missing the intake of pills. It monitors and reduces the risk of over or under dosages by accident. The negligence regarding medicine intake can cause serious issues such as long time for recovery, illness and even demise of the patient. Such things are prevented by giving proper alerts, it also gives an alert to the caretaker if the patient does not consume the medicine. The system increases the effectiveness of medication procedure and save lives.

IV. CONCLUSION

In this paper, we have proposed a system that is an IoT integrated web and mobile application that helps in the efficient monitoring of the patients. An alerting system has been given for the patient with the integration of a smart medicine box that alerts the patient to take prescribed medicines at proper time. SMS alerts to the patients as well as the caretakers, updating the check-up details and next appointment alerts are the additional features included. The system provides an effective way of improving a patient's health in the easiest way possible. The system is feasible and is a cost effective way for monitoring the medication process of a patient.

V. ACKNOWLEDGEMENT

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