IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-7, Special Issue-14, May 2019 E-ISSN: 2347-2693

Medibox –IoT Enabled Patient Assisting Device

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DOI: https://doi.org/10.26438/ijcse/v7si14.429431 | Available online at: www.ijcseonline.org

***Abstract*—** The health sector is one among the most important sector which must be given importance. This sector is critical part in human life due to which we must contribute a higher hand to it using IOT. This makes it important in developing an IOT device called Medibox which helps people in taking tablets or medication at right amount and at right period and tablets are dispensed according to user inputs. Medibox will help the elderly patients who usually have memory issue. This device also provide water to be taken along with the medicines which would make it easier for patients consume their medication easily. Medibox can be used by patients who travels regularly and has medications to be taken. This device also makes sure about the temperature and humidity that must be maintained for particular medicines. Medibox can be used in two modes one is online mode using a web age or offline mode using the graphical display on the Medibox. Medibox will also make sure that the medicines preserved with proper properties.

***Keywords*—** MEDI BOX, Online mode, Offline mode, (key words)

I. INTRODUCTION

IoT is slowly making its way through the medical field. IoMT is a collection of medical devices linked with IT systems meant for health care applications. With IoT, there are more number of possibilities in IOMT than before. There are several IOMT devices that has made its way through the medical field for the betterment of healthcare services through technology and IT industry. Our project known as "MEDIBOX" is a healthcare medical device that is based on Internet of Things. In our day-to-day life, people need help with their daily activities, one of which is to take their medications on time. Recent available device is restricted to certain functionality and that is the reason why we are developing this new device called MEDIBOX as called as an intelligent medication dispensing device. This is to help the elderly people who need their medications on time and also who forget to take them on time. This is designed for people who travel often, older people who forget to take it or take the wrong pills or dosage. Also for people who are supposed to take their medications regularly. So, this device is purposely designed to address this issues. Lack of proper awareness about medication, lack of involvement from family and friends, forgetfulness are the reasons why people don't take their health concerns seriously. So the absence of proper medical administration and monitoring can lead to health complexities. This is a portable, multipurpose and IoT based device that solves this issue. To avoid under and over dosage of medicine, MEDIBOX is designed to alert the patient with the right dosage at the required time. The medical history of the person is important, so the medication details are uploaded to the cloud. This device assists the patient regularly to avoid any further consequences. The MEDIBOX design Comprises of Rasberrypi3b+, Servo motors and 3.5inch LCD display. Water is also dispensed simultaneously along with water. There are two modes in which the device operates, online and offline. In offline mode, GUI is used to display where patient can select a number of pills and specified time at which the pill has to be dispensed. Then this data is stored in a separate data file which can be overwritten again and again. Every day the data is freshly added for that particular day's prescription and the previous day's prescription will be erased. For the online mode, raspberry Pi is used as a host server that takes the input from the web application and performs the same dispensary operation that is required. Hence, in this paper wehave designed a healthcare system and help individuals to take their prescribed medicines on time avoiding future health hazards.

II. RELATED WORK

Title 1: - Medication Adherence: WHO Cares?
Author:Jennifer K. Bussell MD, Marie T. Brown MD
Year: -2011
Abstract: -The pharmacotherapy is used for acute illness. Medicines can help the body to fight diseases, their full benefits however are unknown because most patients do not take their prescribed medications on time and in correct amount. There are various aspects contributing to very bad medical adherence which is multifold and is related to

doctors and hospitals. For this review around 405 articles were sorted which did not include heart related diseases and medical adherence. This review portraits various techniques for betterment of medical adherence.

Title 2: - Medication Adherence by Using a Hybrid Automatic Reminder Machine
Author: -Ying-Wen Bai , Ting-Hsuan Kuo
Year: -2016
Abstract: - This provides an architecture of a medication reminder machine, which includes both aspects i.e pill and remainder module. The pill module uses MCU via software to navigate the LED and buzzer to remind the user about the specified input. The continuous medical tablet/powder bag module uses a MCU with software to control a motor to dispense the medicine bag one by one. The remainder mechanism uses Bluetooth concept to send reminders. The bracelet will sound and flash to prompt the user to pick pills or medicine powder from a specific sack.

Title 3: -Smart Phone Based Medicine In-take Scheduler, Reminder and Monitor
Author: - Mei-Ying Wang ,John K. Zao ,
Year: -2010
Abstract: -Most error prone medication is the out-patient medication. These errors mainly arose because of patients buying medicines and drugs from various drug stores without proper prescriptions. Wedjat is a smart phone application which helps patients manage their medications. Wedjat continuously provide reminders to its users about the right dosage and it automatically records this so that the patients can consult a physicians with these saved records.

Title 4: -Developing the Medication Reminder Mobile Application "Seeb"
Author: - Ebtesam Savari ,Sakineh SaghaeiannejadIsfahani, , Ali Samimi ,Asghar Ehteshami,
Year: -2017
Abstract: -Today, the overall structure of health care systems provides for therapeutic methods. Medication therapy is thus a vital game changer in the medication arena. Any kind of error in medication administration has produced different sorts of issues and the cost borne every year is in billions of dollars. All medication errors can be solved by a medical app called SEEB commonly used by Iranians.

Title 5: -A Medication Adherence Monitoring System for People with Dementia
Author: -Vasily Moshnyaga, Koji Hashimoto, Fumiyuki Hirayama, Akihisa Takahama, Masaki Koyanagi
Year: -2016
Abstract: -Due to lack of memory power, people with need advancement to manage health sector. In this paper we design a model which provides efficient medical aspects which monitors users with memory related problems. Our model not only reminds the user to take medicines but also warns them in case of wrong dosage.

III. METHODOLOGY

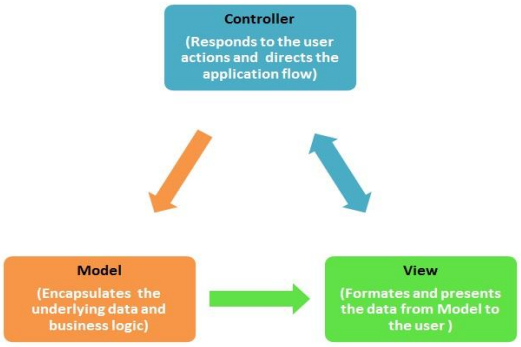

Fig1 the view Model

The MEDIBOX is a sophisticated design that helps people with taking their medication on time and in right dosage. This includes hardware, software and a web application. It is a Programmable automatic dispenser which uses Raspberry Pi 3b+, Servo motor and a 3.5inch TFT touch display. Raspberry Pi uses Raspbian OS and this has different modules such as Wi-Fi, Bluetooth, audio etc in one single component. The pill dispenser is connected to webpage and different pills can be set at different timings, the number of pills to be dispensed and time to be dispensed. This data is then shown on the GUI screen with all the required aspects. Water is also dispensed simultaneously so that user can take pills without any problem. The pills are stored in safe and closed compartment. Servo motors are used to drop down the pills and delivers it back to the patient and buzzer is used to indicate the sound of dispensing. It includes 2 modes

Offline mode

In this mode, GUI is displayed on 3.5inch TFT touch display, where patient can select number of pills and the time the patient has to consume these pills. Then the data is stored in a separate text file which is overwritten every time patient specifies for dispensing.

Online mode

We can either consider Raspberry Pi as Host. At basic level, server takes the input and requests as required by the user. The range of network could either be small or big. Raspberry Pi corressponds to all the request corresponding to Web pages to provide the desired result.
Cloud services can be used which will be connected with the Raspberry pi to provide services for patient. This includes a web application which is connected to raspberry pi so that the user can select the number of pills, time according to the dosage.

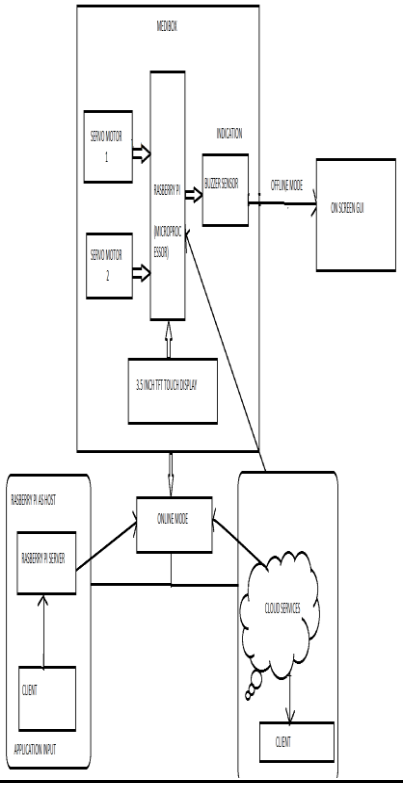

Fig2 Block Diagram of MediBox

IV. RESULTS AND DISCUSSION

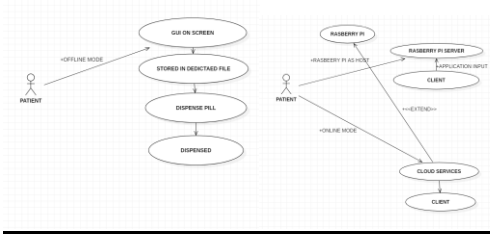

Fig3 Offline and Online Mode

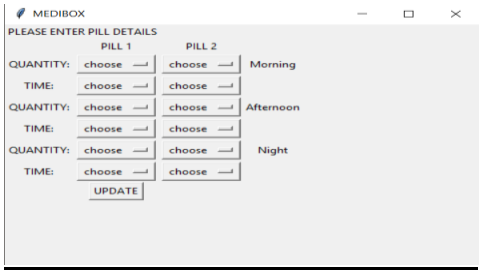

Fig4 GUI

Fig5 WebApplication

V. CONCLUSION AND FUTURE SCOPE

Automatic Pill Dispenser is a model for users who forget to take medicines or tablets under proper supervision. It also stops users from taking wrong dosage at wrong time which would cause severe replications to health. Moreover, this device is simple, reliable and cost-efficient. The Automatic Pill Dispenser works for all sizes of pills. It is programmed for 2 pills with all properties as specified. It has the ability to send, provide reminder three times a day. It has been programmed to dynamically to change the pill requirement and save it in a separate text file that is overwritten every time a new pill is dispensed. Further implementation includes sending a prior message when the dispenser has no more pills in it and can be processed maintaining the edacity of pills along with expiry aspects.

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[2]. Developing the Medication Reminder Mobile Application "Seeb"**Author:** -Sakineh SaghaeiannejadIsfahani, Asghar Ehteshami, Ebtesam Savari, Ali Samimi[2]

[3]. Smart Phone Based Medicine In-take Scheduler, Reminder and Monitor**Author:** -John K. Zao , Mei-Ying Wang**Year:** -2010[3]

[4]. Medication Adherence by Using a Hybrid Automatic Reminder Machine Ying-Wen Bai and Ting-Hsuan Kuo **Year:** -2016[4]

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