

INTELLIGENT MEDI-BOX: A REVIEW

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Abstract - Medi-box is the most frequent thing in everyone's house, generally people will have a separate arrangement such as a box or a container where they could store the medication that they consume regularly. As generations pass, the number of persons affected with chronic diseases has risen dramatically. Everyone can't remember the right time to take their prescription or plan it in a systematic way. It may include persons with a hectic schedule, an elderly person, and Alzheimer's patients. People may be required to take a variety of drugs at varying intervals of time, and they may become confused as to which medication to take because most pills are of similar color and size. Some people may take more medicine than is recommended, resulting in an overdose and potentially catastrophic consequences. The "INTELLIGENT MEDI-BOX" is intended to prevent all of these issues and to sustain a person's well-being and excellent health by reminding them to take medication at a certain time as prescribed by their doctor. The major goal of the proposed system is to ensure that, patients take their medications at an appropriate time. This proposed methodology ensures that it fulfills the role of a caretaker by reminding the individual to take their medication on time. It sends updates to the cloud about pill supply levels and sends alarms when the prescription isn't taken.

Key Words: Alzheimer, Caretaker, Chronic disease, Medication, Patient, Pill count.

1. INTRODUCTION

Nowadays, technologies need to be updated with developing generations who tend to adopt a modern lifestyle. Medicine has not always been the precise science that people know. Favorably medication is developing from generation to generation in-order to increase life expectancy and to cure various deficiency, diseases and disorders to ensure good health with a proper intake of medications. Medication adherence is a word that describes how closely people follow their healthcare professionals' prescriptions. Patients who fail to take strict medication regimens remain ill longer.

Many problems arise due to the enormous dependency on the medication and people fail to manage these procedures regularly in a right way. In such cases the objective is to give out the patient right pills at the right time. Managing the schedule, sorting the medication and dispensing the right pills at the right time to the patient may sometime have a higher error rate if the wrong medication is consumed by the patient. Most of the people around us are suffering from

chronic diseases like Diabetes, Asthma, Arthritis, Cardiac issues, Cancer, etc., According to the Health Promotion Administration (HPA)'s investigation, 88.71% of senior citizens suffer from at least one of these chronic diseases [1]. Many health-care organizations, practitioners and researchers have acknowledged that, increasing the use of patient reminders can improve chronic illness treatment and patient satisfaction.

Most of the time, people seem to forget & take more medicine than their doctor has prescribed. Because of the deteriorating memory, the elderly is particularly vulnerable to this problem and in severe situations, patients may forget that the recommended medication has already been taken and retake the same pill numerous times within the same time frame. This may not be harmful to lighter medicines but makes severe reactions for some strong and concentrated medicines. To resolve this problem a step is taken to develop a medication reminder and monitoring system.

The proposed system alerts the patient [2] to take medicine and also monitors that if the patient has taken the medication from the container or not. If taken, the pill count is updated to the cloud. If the patient fails to take the pill from the container, it sends an alert to the primary caretaker which in turn helps the patient to maintain their health in a better way by consuming the right medication at the right time.

2. LITERATURE SURVEY

The authors of article [3] propose a smart medicine box that uses IoT technology and contains features such as measuring sensors. The device, which incorporates an alarm and a LED display, is programmed using the Arduino-Mega. The IoT is being utilized to build a smart medicine box with key parameter monitoring sensors. The cloud system through IoT, resolves a difficulty of record management between patient and doctor at the conclusion of the paper.

In the paper [4] authors have explained about the details of medicines which are stored in the cloud database and remainder is set according to the user convenience. The Arduino device fetches the real-time data and sends it to the application. A mobile app that generates alarm signals to remind patient to take medication is developed. The availability of sensors and other medicinal services gadgets (IoT) work better in consideration of patients allowing the real-time monitoring.

The authors of paper [5] explain the sub-boxes of the medicine box that are made available to help patients with medicines that must be taken at different times throughout the day. The current temperature of the surroundings is measured using the temperature sensor, and the user is notified if the temperature reaches 25°C. The temperature sensor also offers audible and visual notifications to tell the user when a specific medicine needs to be taken or restocked. The purpose of a mobile application is to send SMS and email alerts.

An overview of a modern healthcare IoT platform with health monitoring and diagnostics is presented in paper [6]. The data is taken and transferred using an ESP8266 Wi-Fi module connected to an Arduino board via a Wi-Fi shield, and the Magnetic Reed switches are long-lasting and operated by stepper motors. A remote user interface works hand in hand with RoboRemo software programming to assist patients in communicating with their guardians.

A pill dispenser is described in paper [7] as being developed to reduce mistakes in hospitals and elder homes. The technological convergence of IoT, wireless area networks, and cloud computing has made a significant contribution to health care by improving the quality of patient-focused monitoring, which is a component of E-health care services, and includes medical data collection, aggregation, transmission, and analysis.

In paper [8] a mobile-based automated rest system that enhances medication adherence and blood pressure in people with high cardiovascular risk. Salubrity is an android based operating system designed primarily for smart phones and reminding the medication with image and alarm.

The parameters such as ARM 7 are explained in Paper [9], along with the software tools Oregon Computer-Aided Design, which is used to build the schematic diagram, and KeilVision4 and Flash magic, which are used to run a program. This compiled code was written into the microcontroller using the Flash magic programmer. Using various instruments at various stages of the medicine box.

In paper [10] the author explains about reminding the patients along with how many pills and set the remainder for the same using web or mobile application helping the user with the medication time. Pill indication is made with the help of color recognition where a color is assigned to each pill and the respective colored LED is set. When the respective LED is on, it says that it's time to take that particular medicine.

According to Paper [11] the hospital stores the patients' medicines into medical bags and prints a matrix barcode on each medicine bag with information such as the patient's name, patient Id, hospital name, hospital id, medicine Id, medication time, and other pertinent information. A camera will be installed on the inside of the cover to detect the

barcode, and the user interface will be installed on the outside of the cover to provide pill reminder and alarm features.

3. PROPOSED MODEL

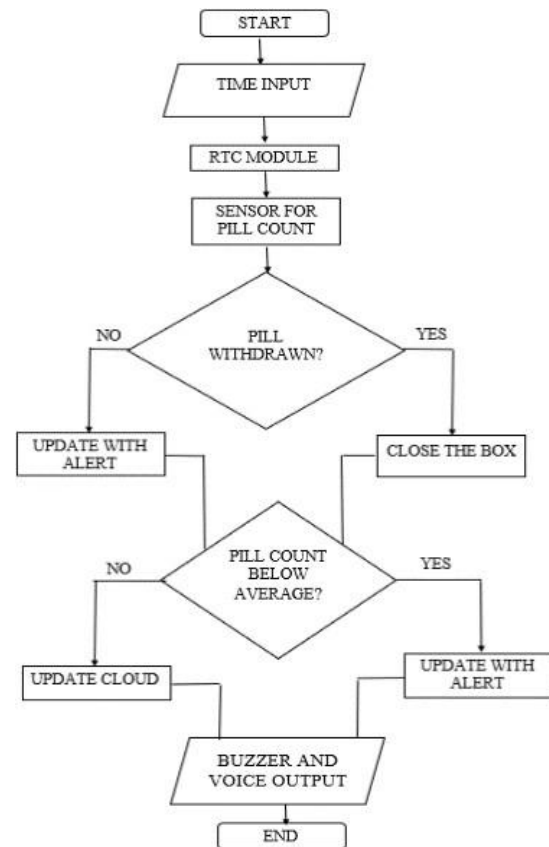


Fig-1: Flow Chart

Fig -1 shows the flow of the processing of the Intelligent Medi-box starts by giving the time as input through an android device which is used to set the time for the device to alert the system according to the predefined description. An RTC module is used to automatically monitor the time from the time that is set originally. When the timing matches the present time, the system informs the patient to take the prescribed medication, and the servo motors open the appropriate medicine slot.

The IR sensor is employed in the suggested model to sense the patient's movements, and when it detects the motion of the patient's hand, it decreases the pill count by one. If the sensor senses the patient's hand and the pill is withdrawn it closes the slot of the box else, it will update the patient or the primary caretaker with an alert. This process is continued each time according to the time allotted based on the prescribed time to take the medication. If the pill count is below the average value defined, it updates the caretaker or the user with the alert else, it updates the cloud data. Here, the system uses a buzzer and voice output to alert the user for the intake of medication. It also solves the problem of

keeping the track of the pill count giving the alert if the count is low.

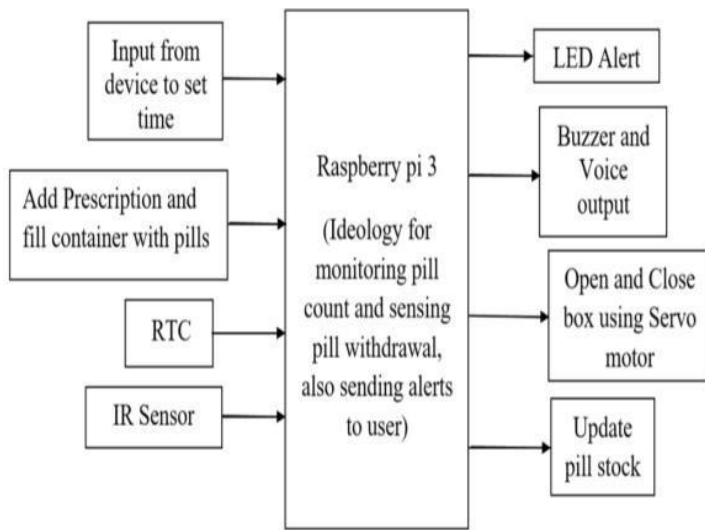


Fig-2: Block Diagram of Proposed Model

4. SYSTEM DESIGN AND WORKING

The proposed model's block diagram is shown in Fig -2. When the user's device and the Medi-Box establish a connection, the system begins. The Raspberry Pi-3 create a link. The device provides input to the box, allowing it to select the time at which alarms must be notified in accordance with the prescription. When the date and time match the predetermined time, an alarm is triggered to remind patients to take their medicine at the appropriate time [12]. An RTC Real Time Clock module is used to monitor the time; the date and time automatically run from the calendar specified initially, and when they match the predetermined time, an alarm is triggered to remind patients to take their medicine at the appropriate time. An IR sensor is used to sense the motion of the user [13]. The IR sensor emits IR radiation and if the radiated signal reflects to the receiver then the output of the sensor can be decided by the IR receiver depending on the intensity of the response. When it senses motion or heat in the user's hand, it produces an output that monitors pill withdrawal while simultaneously lowering the pill count by one, and the procedure is repeated each time medicine is due. Hence it is used to monitor the count of pills. And the problem of keeping a track of the number of pills is also solved. It also gives an alert to the user if the count is low.

The count of the pill is being stored in the cloud through Amazon Web Services (AWS). When the count is low Medi-box reaches the care-taker with an alert through Wi-Fi which is inbuilt in Raspberry-pi 3. The goal of this proposed project is to send an alert at a predetermined time, monitor the pill count, and determine whether the pill is taken from the container or not. If the pill is taken, it should update the pill count; if it is not taken, it should send an output to the

device indicating that the pill has not been consumed, as well as send an alert about the stock of the pill present in the container [14] [15].

When the given time matches with the real-time the system gives a LED output along with a buzzer and voice message saying, "It's time to take the pill" and the respective medicine box is to be opened automatically at the prefixed time. The Servo motors are in charge of the automated opening and shutting mechanism. Here, the output of RTC acts as input or trigger to the servo motor and the motor runs according to the protocol. It also gives an alert of withdrawal of the pill. Later it updates the cloud with the appropriate information and the loop continues till the system is shut down [16].

5. CONCLUSIONS

According to common observations, people prioritize their job over their health. People who are older often fail to take their medications on time or get overdosed. As a modern healthcare device, this proposed model 'Intelligent medi-box' is designed to alert the patients to take the right medications at the right time. By collecting a few reference papers, a literature survey is conducted on the topic. Intelligent Medi-box is a combination of the physical and digital remainder system that benefits individual of all ages. The working principal is discussed in detail using a block diagram, which covers pill dispensing and monitoring of pill count in the container. It also updates pill count to the cloud. The proposed model will be useful for elderly persons who are suffering from any of the chronic diseases.

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BIOGRAPHIES:



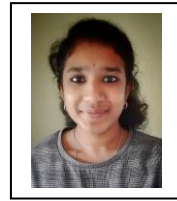
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