

Automatic Pill Dispenser Robot

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Abstract— There can be a lot of individuals, who need constant help may it be our elderly people, family members, the ones who have special needs. These people apparently need the kind of care which Most busy family members cannot provide. Some people may forget to take the medicines at the correct time and can forget the medicines which they have to take. So in order to help them with this liability we have developed this paper. The people are provided a “Pill box Robot” enhanced with android application which there will be a display which notifies the elder about the medicine. Along with this we can alert them with an alarm. So that even if the person is sleeping or busy with some work the alarm helps in alerting him. To confirm that the person has taken that medicine or not we can put one IR Sensor at the opening end of the pillbox. So when the person tries to open the box the IR Sensor Recognized and the alarm will be off only. By this data we can tell that the person has taken the medicine. It comes with one more feature that when the person is taken the medicine intimate to the related persons by using Wi-Fi Technology. By this system helps patients to take the required medicine in the right quantity at the right time.

Key words: Robot, GPS(Global Positioning System),WI-FI Technology , IR Sensor , liability.

I. INTRODUCTION

The medications you have been prescribed are more likely to be effective if you follow your doctor’s exact instructions on when and how to take them. Your doctor has prescribed a particular medication because he or she feels it will treat your condition in a specific way. However, this medication is more likely to be effective if you follow your medication course as prescribed. Failure to do so could, in some circumstances, have life-threatening consequences. Common medication mistakes done by Elderly people that they need to take several tablets each day and if they are living on their own they may not always remember. It may be difficult for them to remember the prescribed schedule, particularly when taking multiple medications at different times of the day or having to take a medication on a different schedule, such as once a week. Many people are not sure what to do if they miss or skip a dose of the medication. The main objective of the paper is to distribute pills to the patients or elders at required time easily and efficiently and also to develop a valid and effective device to assist people in taking correct doses of prescribed medicine

currently used for improving this situation by reminding the scheduled of medicine, remote monitoring and update new medicine Consume data of patients, which can be done by prescriber through IOT. The new awaited feature in our paper is our system is sensible that patient has taken medicine or not and thus the patient can’t postpone the time on which he needs to take pills. It is compulsory for the patient to take pills from the box at the right time otherwise our systems continues to make large sound until the medicine is taken out from the box. This

notification feature adds life years to the patient and thus this thing is not available in any device which is the necessity for present days.

We have developed a device called "smart pillbox" to help aging Population to consume the right medication at the appropriate time according to his requirement. This system improves the existing system by alerting the user at the particular time again by setting the count each time and the order for the particular pill is sent by the system automatically to medical shop through GSM. Advantages of this system is that as multiple times a user required more than one pill of same medicine or more than one person are using the same system. So this system updates the count of no. of pills removed by the user. If pills remain less, the purchase order sends automatically to medical shop also only guardian can use the android application. User can login in app through their mobile IMEI number. User can do all functionality through android app, which they can do from web application like, add medicine schedule, set schedule, view patient details, add medicine etc.

II. LITERAURE SURVEY

There are a lot of individuals like handicap persons, senior citizens and many more medically unfit persons who need constant help to take their medicines. These people apparently need continuous monitoring which most busy family members may not provide due to their busy life schedule. Also some people may forget to take the medicines at the right time. So in order to help them with this liability, we have decided to design and develop an intelligent pill box system which will give them the remainder regarding pills to be taken time to time without fail. Even if the person is sleeping or busy with some work the alarm helps in alerting them for taking the medicine[1]. The paper includes robot movement using android application, IOT technology for communication and Bluetooth module is used for communication between the controller and the android application. The robotic pill dispenser is based on the principle of automatically reminding patient to take their pills on time using a timer algorithm. The main feature of this paper is that it can dispense pills to multiple patients. This is made possible by controlling the motion of the robot using a android application. The remote works with the help of GSM module which is a Transceiver that communicates through radio frequency[3]. We used PIC18f3550A as our main microcontroller as it very reliable, low cost and can be easily interfaced with multiple peripherals.

For a automatic pill dispenser a mechanical model that efficiently provide the pills at the required time. The pill provider model should be properly synchronized with the timer module. For achieving this we made cylinder of glass which is divided into four compartments. This cylinder is attached to the stepper motor which controlled by microcontroller through a micro stepper driver that provide precise micro step rotation of stepper motor [5]. So as stepper motor rotates the cylindrical rotates simultaneously. A real time is the most important part of our paper that gives the exact time of pill dispenser rotation. A rover is also present that is controlled by a remote through radio frequencies which makes our pill dispenser movable. Firstly we made algorithm for

the automatic pill dispenser. Then we designed our mechanical model and interfaced all the software part and the hardware part with it. Then we made the algorithm for the remote control and made the rover model and done the software and hardware interfacing. Thirdly we attached the rover section with the which made our paper a movable automatic pill dispenser which is very robust and efficient that can be used easily for providing timely medication to patients.

The usage of pill box is a common method to remind people about their medication schedule. The most widely used type is plaid-based pill box. It is used to put medicine with a schedule such as daily pill box, weekly pill box, weekly four times pill box etc. Besides, pill dispenser also helps the patient to remind themselves to take medicine on time. In the market, there are various types of pill dispensers that have been produced by different companies. For instance, GMS MED-E-LERT automatic pill dispenser, E-Pill @electronic dispenser, E-Pill's tamper proof automatic medication dispenser, and Philips medication dispensing service[11]. The available pill dispensers in the market only consist of built-in alarm for medication time notification. It is difficult for the elderly patients to hear the alarm due to the age-related hearing loss, and especially when the pill dispenser is placed far from them. Recently, many modifications on the pill box have been done by other researchers. For instance, an electronic pill box called Med Tracker as proposed in can record the time of medicine taken from the box. Then, a smart pill box proposed in comes with reminder and confirmation functions, by incorporating the use of matrix barcode printed on the medicine bag[9]. Lastly, an intelligent pill box as reported in proposed a medicine bag system with notification system using the Skype application[6]. Thus far, there is no any pill dispenser to remind the patient to take medicine through the popup notification on the smart phone. Hence, we use the available technology to send notification to the patient through the smart phone; alarm was not built-in in the pill dispenser. Alarm is the notification that popup on the smart phone using the Instapush application. Combination of infrared (IR) sensor and microcontroller will control the medication dose (number and type of pill) and duration of the medication intake[7].

III. WORKING PRINCIPLE

Fig. 1 shows the construction of proposed system. The system consist of two section i.e pill box section and Monitoring mobile section.

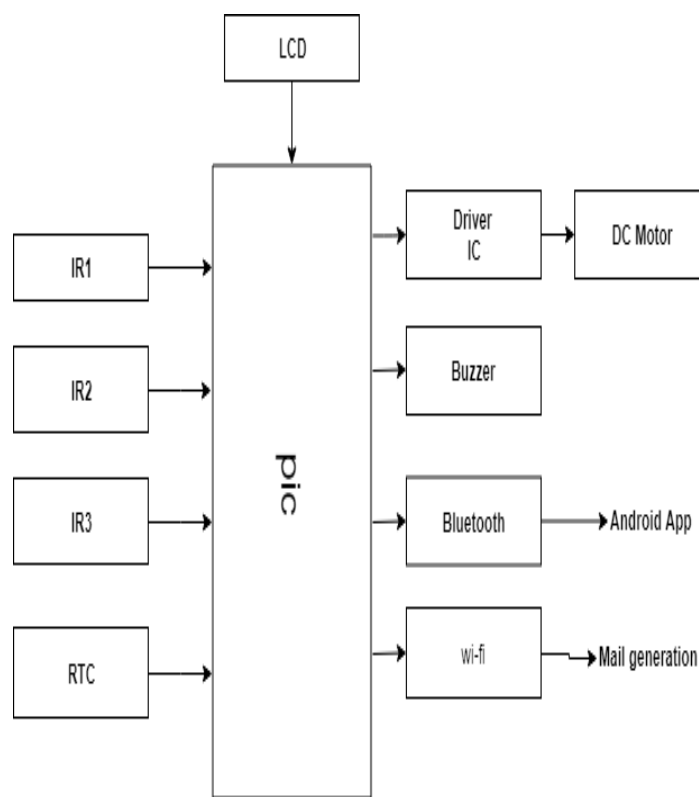
I. Pill box section :

This section consist of controller, IR Sensor, Wifi module LCD, DC motor, motor driver. IR sensor is used to identify the box open or not. It is interfaced to the controller by using pins. RTC module is used for identifying the time and date it is interface to the controller. Based on this time and date automatically gets updated. DC motor is used for opening and closing of pill box.

II. Monitoring Mobile section :

In this Mobile is used for receiving the mail from the Pillbox section. It getting messages like medicine is taken or not. Firstly the proposed system gets the hour information from the Real time clock (RTC) and compares with saved hour in controller in order to create a specific alarm for each dose of medicine. This device includes a box with different compartments in order to help the patient to take the correct dose of medicine from the pillbox. It is activated when the door opens, In addition to this; the LCD display monitor is used to show the information about patient, hour and dose that should be taken .As per the saved time in controller when the alarm get on with the help of motor the box which contains pills will get open. The alarm activates the notification system that sends an SMS through the android application to the patients phone in

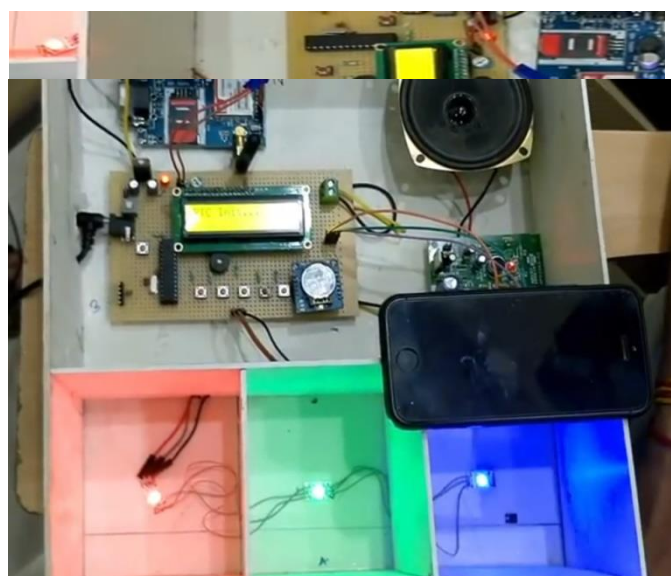
order to remind them of taking the medicine. If the patient takes the medicine, we get message "MEDICINE TAKEN ON TIME ".If the IR sensor Doesn't receive any signal the message "MEDICINE SKIPPED" is sent to the phone through Android application via Bluetooth module.



IV. RESULTS

Fig. shows an external view of the experimental setup. Here we first placed some medicine in all the three medicine box.

We performed two kinds of experiment. First we set a time as 10 O'clock. At 10 o'clock first alarm bell ring then the patient take the medicine then the IR sensor detect an obstruction and the count of the medicine is changed after a confirmation from the app that the patient has taken a the medicine. Second experiment when the patient does not take the medicine the robot an alarm after every 10 min intervals for 3 times. If after the time also the patient does not take the medicine then an alert SMS is send to the family member using thinkspeak server informing that the patient has not taken the medicine.



To improve medication safety and to avoid confusion in taking tablet among the elderly, this paper is implemented as a smart pillbox with reminds and confirm functions. The implemented pill box can reduce family member's responsibility towards ensuring the correct and timely consumption of medicines. Because the implemented pillbox containing an alert sound to the user for a particular time and real-time clock gives continuous time as an output.

After the design was selected, a lock system was be added for pillbox. The device will be used only by; doctors, keepers, and patients without significant disorders. They would only program the device with a personal password.

In this process the touch function is not available, but the goal is to use this interface to configure the medication scheme.

V.CONCLUSION

To improve medication safety and to avoid confusion in taking tablet among the elderly, this paper is implemented as a smart pillbox with reminds and confirm functions. The implemented pill box can reduce family member's responsibility towards ensuring the correct and timely consumption of medicines. Because the implemented pillbox containing an alert sound to the user for a particular time and real-time clock gives continuous time as an output.

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VI. DISCUSSIONS AND FUTURE WORK

This paper has presented the complete design of a low cost scalable pill dispenser. The current prototype meets our primary objective of creating a hands-free robotic medicine dispenser capable of counting and dispensing medicines with zero risk of cross-contaminations based on simple designs and the utilizations of low cost materials and components.

However, there are numerous improvements and potentials for upgrade that can be done onto the prototype. The most important area of improvement would be how we time the medicine dispatch. As presently we time the pill in the coding done for the PIC controller which is not always feasible as only the developer know where the changes that has to be done.

In the future, the key parts of the machine require redesigning to make it more comparable with existing medicine dispensers in terms of performance, storage size and counting efficiency. In addition to that, the implementations of barcode, automated labeling of vial and verifications of medicines using image processing are possible potential upgrades that can be made to the system. Furthermore, the timing of the medicine can be more user friendly and the user can self-time the medicine in take using the Android app itself which will make the robot more user friendly .

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