

Smart Pill Dispenser

Abstract

With an increase in the number of health problems, there is a need for a device to maintain and monitor the medicines of an individual. Management of prescribed medicines can be difficult, especially for senior citizens. We have put forth a design of a smart pill dispenser which will remind patients to take their medications on time and avoid underdose, overdose and skipping medications. The device is a compact, inexpensive and portable assembly. It makes the process of taking medicines comparatively easier. By taking advantage of flexible scheduling provided by medication directions, the device makes the user's medication schedule easy to adhere and tolerant to tardiness whenever possible. The report describes the action-oriented design, major components, hardware, and software structures of the Smart Pill Dispenser.

Objectives

- Construct a device that is relatively small and lightweight.
- Develop the software in such a way that patients receive their medication reliably and safely as prescribed by their physician.
- Use as much off the shelf technology with basic electronic components to keep costs low.
- Develop a device that can perform all the necessary functions as stated in the project abstract.
- An audio and visual alarm to notify patient that medication needs to be taken.

Design

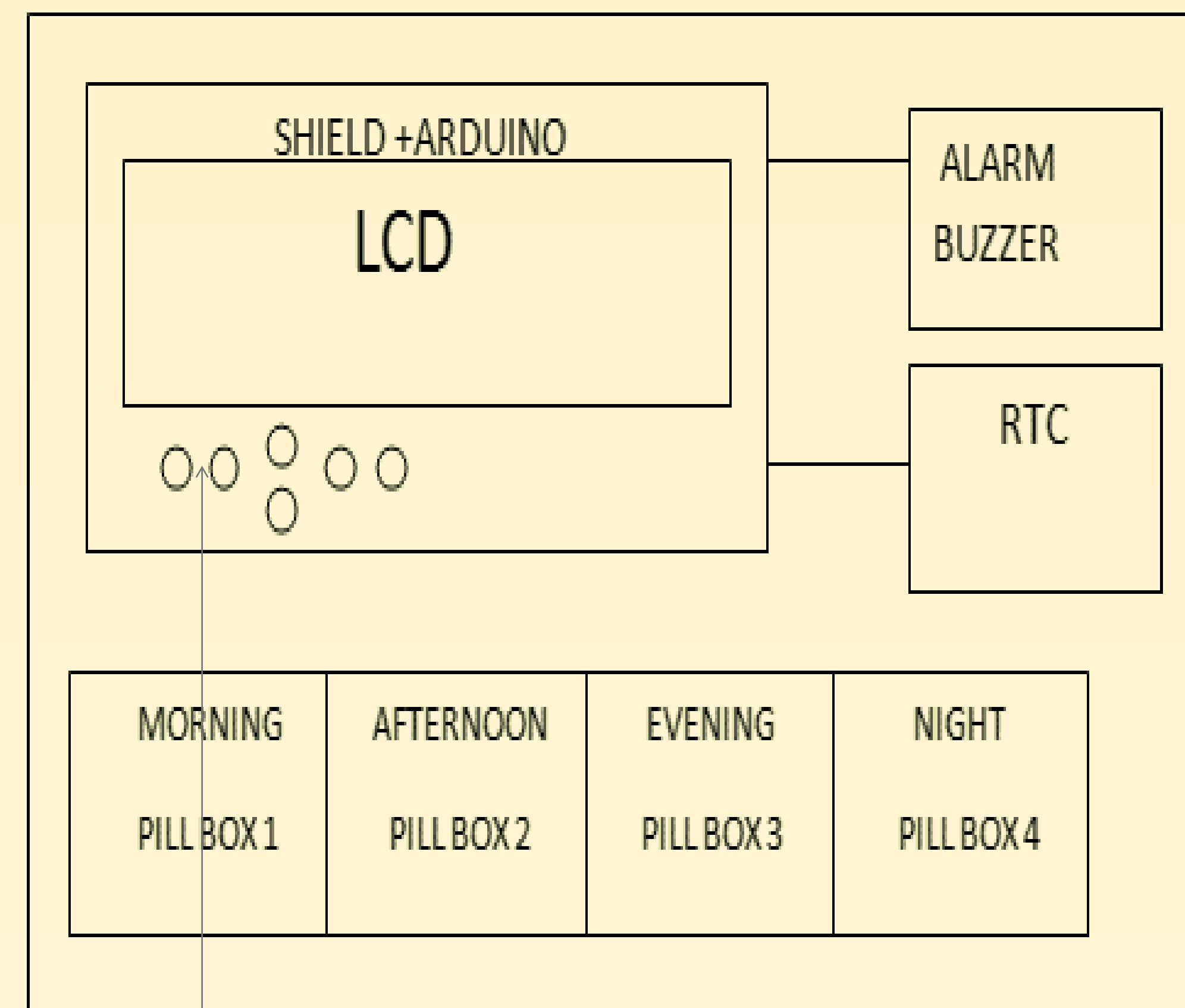
The smart pill dispenser is encased in a box which has four major components:

- Arduino Uno board
- RTC module DS1307
- LCD Keypad Shield for Arduino
- Active buzzer alarm module

We have also attached three LEDs to indicate which pill box has to be opened by the user.

To power the entire setup we have used 6F22 9V battery.

Block Diagram



Control Buttons

Fig.1. Block Diagram of the Smart Pill Dispenser

Working

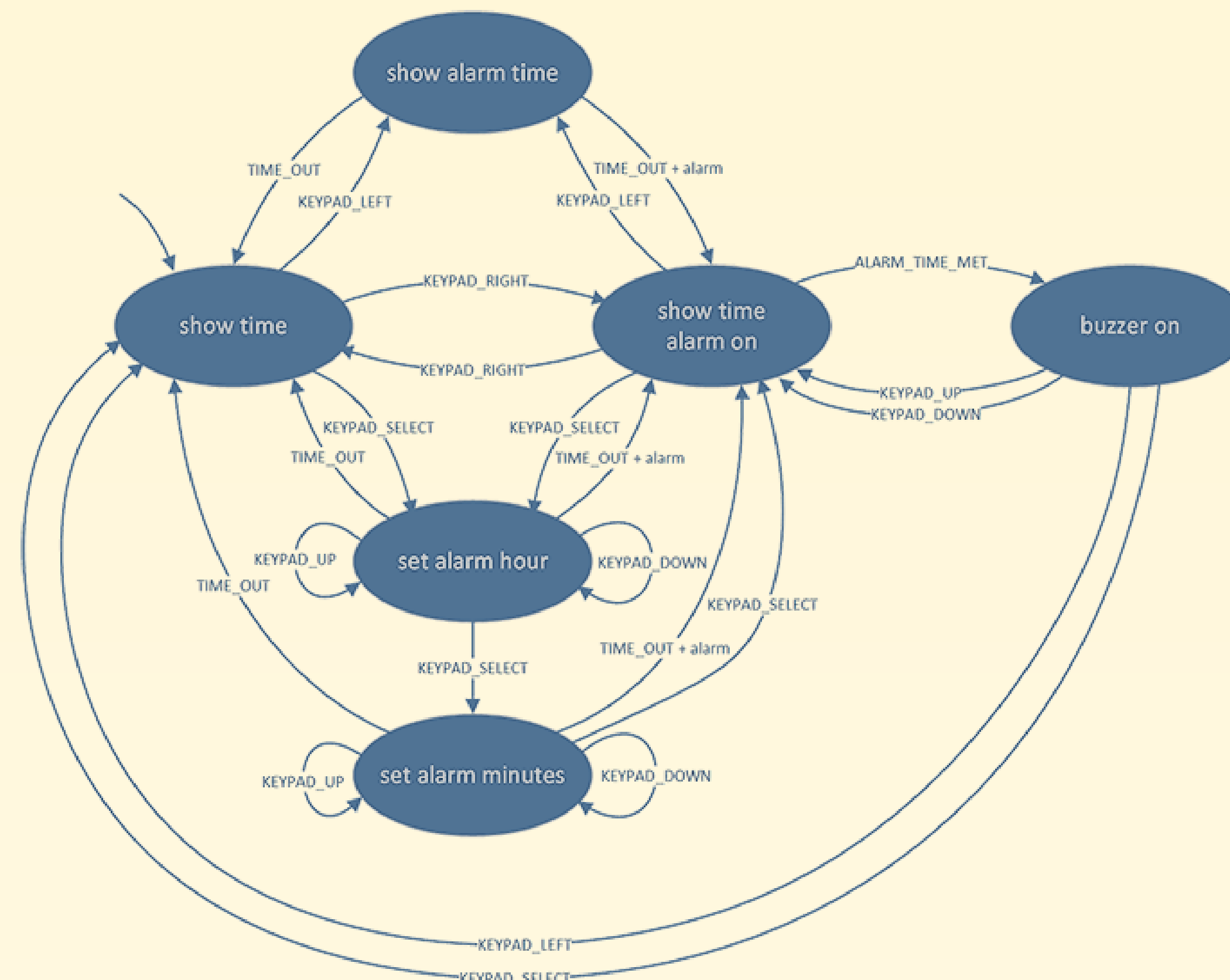


Fig. 2. Flowchart of the Alarm of the Smart Pill Dispenser
<http://blog.codebender.cc/2014/01/16/alarmclock/#comment-41737>

The entire code is divided into states. Therefore, when a button is pressed, it transitions between states depending on the function. We have made use of predefined Finite State Machine (FSM) states like 'ALARM_TIME_MET' and 'TIME_OUT' and the rest of the states are user-defined functions which are called when a certain criteria is fulfilled.

We start at the 'show time' state. Here, the date and time appear on the screen.

The following buttons have the following functions.

- RIGHT – The alarm turns on and an ALARM indication appears on the screen. By pressing the RIGHT button again, the alarm turns off.
- LEFT - Shows the alarm time. Also used to turn off the alarm.
- SELECT - Set Alarm 1 in hours. By pressing it again, you can set minutes. By pressing the LEFT button again, you can set Alarm 2. The same process continues till Alarm 4
- UP - Used to set alarm time by increasing the number. Also used to snooze the alarm
- DOWN - Used to set alarm time by decreasing the number. Also used to snooze the alarm for ten minutes

Results



Fig. 3. Circuit encased in a box (not sealed)



Fig.4. Circuit encased in a box (sealed)

- We interfaced the Arduino board and the LCD Keypad Shield with the Real Time Clock (RTC) module to display the current date and time.
- We tried to set the alarm for a particular time and make the buzzer beep. We were successfully able to set the alarm.
- We were able to set multiple alarms for a day and also a timely alert to re-fill the boxes with pills.
- We made the LEDs glow according to the alarm time

Thus, we finally put the entire assembly into a box of desirable dimensions with four pill boxes for storing the pills for the respective times of the day. The box has openings only for the LCD screen and the control buttons.

Conclusion

Timely medication is very necessary for the cure of any disease. The proposed Smart Pill Dispenser would remind the patient to take the daily medication on time by giving audio and visual signals. It would ensure that patients take their medicines on time. This system would be light-weight, compact, cost-effective and portable, such that it can be used by everyone.

Future Directions

We might consider making the pill dispenser a rotating assembly attached to a motor, which aligns the respective slots at the time it has to be taken.

We also plan to design an application to keep the records of the medication taken and the history of the time when it's taken, to adjust the next medication according to the previous medication, to give access to the caretaker of the patient logs.

We plan to work on the power supply to make it more effective and smaller.

Thus we hope to bring some innovation to the existing project to add to the attraction to the device.

References

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