

Intelligent Pillbox: Automatic and Programmable Assistive Technology Device

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Abstract: There can be a lot of individuals out there 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 project. The people are provided a Pill box on which there will be a display which notifies the people 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 GSM Technology. By this system helps patients to take the required medicine in the right quantity at the right time. It will read out the medicine name and the dose of the medicine. Still if they fail in taking tablet the alert will be sent to the next contact person so that he is intimated about the situation. If the pills are about to get over, the notification is sent to appropriate person so that he can get the pills before it get over.

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.

II. Design of Proposed Hardware

The disadvantages mentioned in the literature survey are overcome and new methods are being implemented in this system. In this proposed system consists of three sections one is in the Pill box and another one is monitoring mobile section and moving the box pill where the bad is present.

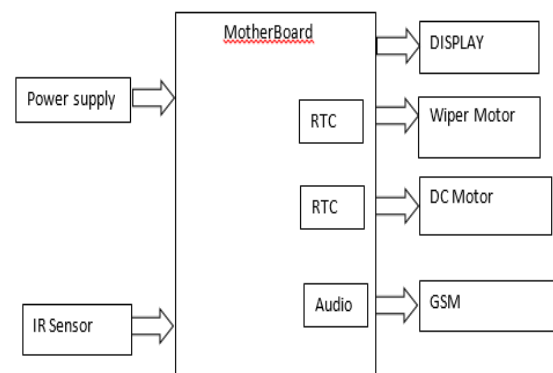


Figure 1.1: Design of the Proposed Hardware System

The System is composed of different modules that are controlled by motherboard. There are different types of communication of each module. It could be one way or two ways. Therefore motherboard sends command to the modules but also

receives data from them. The objective of this analysis consists about using free hardware and software in order to develop a valid and effective device to assist people in taking correct doses of prescribed medicine.

Pill box section

In this Pill box section consists of motherboard, IR Sensor, GSM, DC Motor and wiper motor. Here IR Sensor consists of IR Led, IR Photodiode IR led continuously emits the light and Photodiode receive the light. This concept is used for identifying the box open or not. It is interfaced to the motherboard by using GPIO pins. RTC module is used for identifying the time and date it is interfaced to motherboard by using I2C Protocol. Based on this Time and Date automatically updated. Pill box will be opened to open the pillbox by using DC Motor interfaced to the GPIO pin of the motherboard.

And also provide voice information regarding Medicine name and dosage by using Voice IC interfaced to the GPIO pins of Motherboard. All the information updated to the monitoring person by using GSM Module It is interfaced to the motherboard by using UART Protocol.

Monitoring Mobile Section

In this Mobile is used for receiving the messages from the Pillbox section. It getting the messages like medicine is taken or not.

Programmable Alarm System

Regarding to different medication schedules, this device allows to program the exact hour to take medicines. A prior this programming would be stored by the patients on the motherboard. The proposed system gets the hour information from the Real time clock (RTC) which is in built in motherboard and compares with saved hour in order to create a specific alarm for the each doses of medicine.

User Interface

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 display monitor is used to show the information about patient, hour and dose that should be taken.

Notification System

The alarm activates the notification system that sends a SMS through the SIM900 to the patients phone in

order to remind them 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 send to the phone through GSM Module. The band in the hand of the person also monitors the temperature and heartbeat of the person.

Moving System

The band in the hand of the person is identified by the pill box and move to the person when it's time to take the dosage. If the person is sleeping in bed and can't bend down to take tablet, the wiper motor will get the pill box up so that they can take the pill.

Flowchart

The flowchart given below explains the operations of the design under different conditions and their response. We can realize the optimum code that will resolve the complexity surrounding the project. With the detection of Power, all the registers are cleared of the previous values and previously stored values are loaded from the memory. The Real Time Clock (RTC) within the controller board is initialized.

There are 3 basic modes for this system. They are

1. Set current data and time.
2. Set Medicine frequency and Voices.
3. Display mode.

The Set Time and Date mode will enable the user to adjust the time and date of the display system according to his country's standard time. The set medicine frequency is for enabling the user to set the time of that particular medicine to be taken at that time and also store the voices during the course of time.

Display mode is the normal mode of operation. It displays the current time and date of the day. After the normal mode of execution, the alarm function checks for the time to map with set alarm values.

If the current time is matched with the set time of medicine, then the pillbox opens and voice is received and the message is to the phone through the GSM Module. The IR Sensor waits for some time, if the patient takes the pill the pillbox closes. If pill is not taken message is sent to user that corresponding pill is not taken.

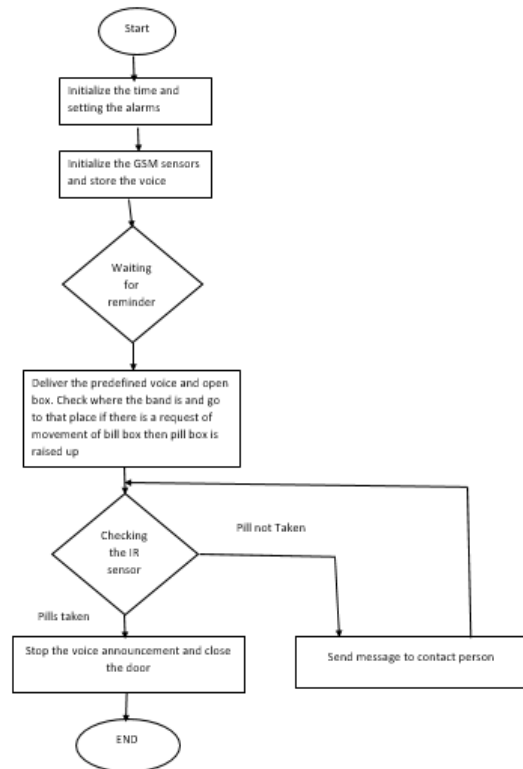


Figure 2.1: Flowchart

III. Results

The controller obtain the hour from the RTC, the alarm is set when it's the correct time. The controller sends command that activates the motor and also sends the SMS to the patient. If the patient takes the pills from the correct compartment, the IR sensor notify to the controller and this closes the doors, but if the IR sensor does not send any notification after a set time. During this process the exact hour is display on the display and when the alarm is set this shows the information about the correct dose.

IV. Conclusion

To improve medication safety and to avoid confusion in taking tablet among the elderly, this paper proposed a smart pillbox with reminds and confirm functions. The proposed pill box can reduce family

member's responsibility towards ensuring the correct and timely consumption of medicines. Because the proposed 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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