

# Smart Medication Box for Memory Disorder Patients

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**Abstract:** - In stressful life people are prone to different types of diseases and accordingly varieties of medicine are increased. In ICU's of health care centers patients are monitored through experts and advanced machineries to give the proper treatment. But in general ward and at home continuous monitoring is not always be possible. Many of times patients are not able to remember their medication time without the active assistance of a caregiver. This restricts their ability to live independently. This paper describes the design and develops a smart medication box which reminds the patients to take proper medicine within stipulated time.

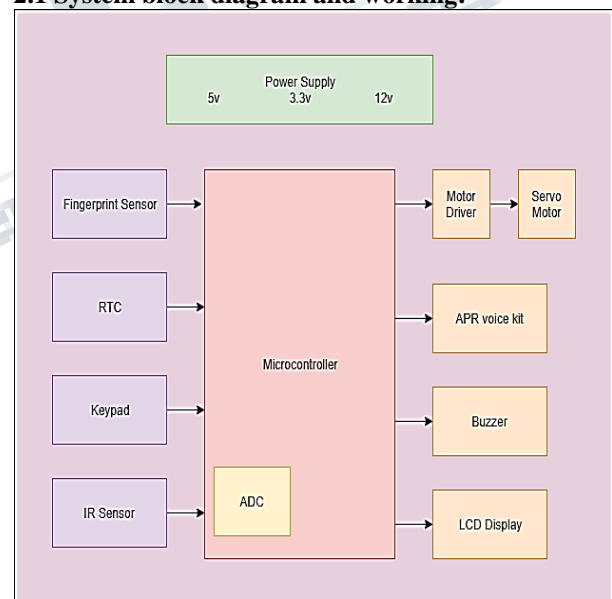
**Keywords:** - Arduino, caregiver, power jack, brace matching.

## I. INTRODUCTION

The progress in medical technologies is one of the main contributions for the ageing population [1]. Medication safety for the elders and especially to memory disorders is very important [2, 3, 4, and 5]. The elders need support from family members to take the proper medicines within time [6]. This project is useful for all types of patients and especially to memory disorders. In design of Smart Medication Box for Patients having mental disorder combination of Arduino controller based hardware and software is used [7, 8]. The project is provided with a Buzzer. The beeps of buzzer are indication of medication time of patient. That will help to remind to take the pills within stipulated time period [9, 10, 11, and 12]. In the medication box an APR used to play the recorded voice clips of instructions to the patients. With this box, people do not even to worry about how to manage their all medication time because this product have provided with a display clock as well as reminder to alert them about their medication time [13, 14, 15].

## II. MATERIAL AND METHODS

### 2.1 System block diagram and working:



**Figure 1 Block Diagram**

### Working:

The figure 1 shows smart medication box system uses Arduino Atmega 2560 microcontroller [16, 17]. In this system the fingerprint sensor, which is used for the authentication purpose, is interfaced to Arduino 2560 microcontroller. The user can activate the system with his finger. A real time clock is interfaced to the Arduino 2560 microcontroller which gives real time in hours,

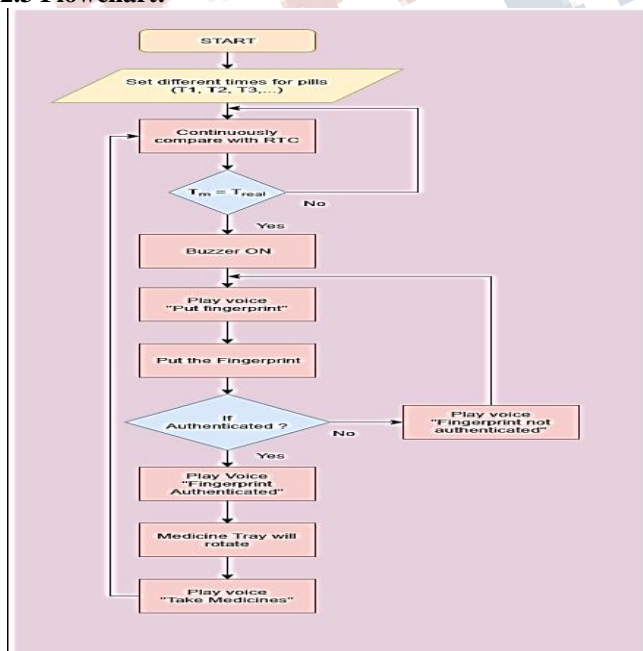
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minutes, and seconds. With the help of matrix keypad it is possible to set up to 3 timings in a day during which the patient is supposed to take the medicines. The Arduino 2560 microcontroller will continuously check the current time with the set time in memory and if the time matches then the buzzer will be turned ON and corresponding medicine tray will open after authenticated by patient. The microcontroller is also interfaced with voice recorder and playback IC (APR33A3). Whenever fingerprint is detected the microcontroller will start corresponding voice clip via speaker.

### 2.2 SOFTWARE IMPLEMENTATION:

Arduino is an open source electronics platform based on easy to use hardware and software. Arduino boards are able to read inputs—light on a sensor, finger on a button, or a Twitter message—and turn it into an output—activating a motor, turning on a LED, publishing something online. The Arduino project provides the Arduino integrated development environment (IDE). IDE includes a code editor with features such as text cutting/pasting, searching and replacing text, automatic indenting, brace matching and syntax highlighting and provides simple one-click mechanisms to compile and upload program to an Arduino board. A program written with the IDE for Arduino is called as a sketch. Sketches are saved on development computer as text files with the file extension .ion. Arduino software (IDE) pre-1.0 saved sketches with the extension .pde. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the wiring project, which provides many common input and output procedures.

### 2.3 Flowchart:



At the beginning medication time will be set up for particular patient as per direction of doctor. If the set time matches with real time then the buzzer will turn on and then the recorded voice message that is “Put the finger on sensor” will play to activate the system else it again start comparison with real time. If the finger matches, voice message “finger authenticated” will play then medicine tray will rotate else once again the recorded voice message “Put the fingerprint” will be played and another recorded voice message that is “Take a medicine” will play.

### III. RESULT AND ANALYSIS:

The trials have been taken on five patients in general ward of hospital. Accordingly groups are classified as below:

Group I: Patients, to who once remind, they can activate the systems and takes the medicine from medication box.

Group II: Patients, to who reminder is necessary for every activity i. e. medication time, system activation, take the all medicine and any other instruction if any.

Sr. No	Response to Reminder	Response for Medication
Group I		
Patient 1	Good	Taken all tablets
Patient 2	Good	Taken all tablets
Patient 3	Good	Taken all tablets
Group II		
Patient 4	Good	Taken all tablets

Patients 1, 2, and 3 gave good response to medication time alarm. They activated system by their own and taken all medicine which was in medication box. Patient 4 gave good response to medication time alarm but unable to activate the system by own i. e. without instruction. Due to feature of voice instruction kit for system activation instruction for patient, patient activated the system with his finger as per directions. Once the system activated, there were many types of tablets found in medication box, to which patient was expected to take. And that was done due to smart assembly; patient gives self response, every time to the instructions to take the tablet that is provided to patient in tray of medication box.

The application gives reliable reminders and good user interface. The medication times will be set and when this time matches with real time then medicine will be dispense from box by using patients finger.

### IV. CONCLUSION

Thus efforts are made to provide reliable services to the patients in terms of time to time reminders about medicines schedules, refilling of medicines without delay, attending the patient as and when required etc. Also to

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reduce both the physical and mental burden on hospital staff, caretakers, family members and patients themselves. The medication reminding and recording function can significantly improve the medication compliance, for elder patients as well memory disorders. The system is enabling with the friendly interfaces easy data logging and hence will be most useful tool for patient monitoring in general ward and at home also.

#### V. FUTURE SCOPE

The work covered in the report tries to solve various issues, which emerged as a result of literature survey. In case totally memory disordered patients extra efforts are needed for better services. With the help of extra trays and robotics for serving water to patients, the design will be suitable for the total handicapped patients also.

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