Smart Medicine Box Using Arduino-Uno for Old Aged People

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Abstract
Our project's main aim is to make a Smart medicine box for those users who regularly take medicines and the prescription of their medicine is very long as it is hard to remember to patients and also for their care giver. Also Old age patients suffer from problems of forget to take pills on proper time which causes certain health issues for patients having Permanent diseases like diabetes, blood pressure, breathing problem, heart problems, cancer diseases etc. We saw these problems in hospitals & people around us who have such kindofdiseases and thus based on these two problems we made smart medicine box which solve theseproblems by Setting up time table of prescribed medicines through push buttons as given in prescription Present time will be saved in RTC module and notification time will be saved in EEPROM. Therefore at the time of taking medicine system generate Notification sound and display the Bright light in certain pill boxes. So, patient can know the specific number of box from which he has to take out medicines.
All pill boxes are pre-loaded in the system which patient needs to take at given time. And our system has quality that it can sense if the patient had taken out pills from the box or not. Another advantage of our system includes of Sensing capability if the patient tries to postpone the time of taking medicine by suddenly opening and closing the medicine boxes to stop the sound. Compare to other devices available in market are capable to generate sound at one time and afterwards it stops. Thus, final result of our system provides fast curing of patient health by using our advantageous system.

I.   Introduction

In day-to-day life most of the people need to take medicines which was not there in past couple of years and the reason behind .This is diseases are increasing in large amount. Life threatening diseases gets mixes with the Human body in such a way that they can't leave the body ever and they increases in rapid time. Life span of humans became less Because of such diseases and to overcome or to live a better life we need to take medicines regularly and also in large amount.

We need to be in advice of Doctor who tells us to take desired pills in desired way so that patients face problems like forgetting Pills to take at right time and also when Doctor changes the prescription of medicine patients have to remember the new schedule Of medicine. The problem of forgetting to take pills at right time, taking wrong medicines and accidentally taking of expired Medicine causes health issues of patient and this leads to suffer from unhealthy life. Our project is to made Arduino-Uno based Smart medicine box which uses Real time clock.

The new awaited feature in our project 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.

II.   Literature survey

The advent of wireless technology along with other communication techniques has helped in making electronic commerce very popular. A modern futuristic product is the one that aids the comfort, convenience and efficiency in everyday life. In this project , we discuss an innovative concept of SMART MEDICINE BOX FOR OLD AGED PEOPLE. The main goal is to provide technology oriented, Low cost easily scalable system for taking medicine.

However, user had to load the pills to the boxes every week. At the time of loading pills in the box, people many time mix their pills with other pills in the same box would increase the risk of making mistakes.

Another type of pillbox in the market is also available, which had the sound reminder, and was able to remind the user to take medicine at user specifiedtime but it only remind the user at once a day. The costs of this type of pillbox were so high about 1000 INR, Therefore, we think it was necessary to build a cheap and functional smart Medicine box that could bring more convenience for the user.

In Ref. [1], a pill box based on a MCS-51 micro-controller was proposed; that pill box can send out medicine using a stepper motor at a scheduled time, but there was no provision to record the time when the patient actually took the medicine. Apart from the abovementioned disadvantages, the other disadvantages of these previous systems are as follows: The family members or patients need to fill the medicine in the pill box manually; this is an additional responsibility for family members of the elderly, or even the patients. Manually filling the medicine in the pill box may cause the medicine to dampen easily.

In Ref. [19], an electronic pillbox called MedTracker was proposed; in the MedTracker, the time at which each lid was opened or closed is recorded, and transmitted to PC via a Bluetooth link. However, the MedTracker does not provide any remind or confirm functions.

In Ref. [2] proposed Multidisciplinary approaches to achieving efficient and trustworthy eHealth monitoring systems (2014), The technological merging between IOT, wireless body area network and cloud computing have vital contribution in e health care which improve the quality of medical care, basically patient centric monitoring play a role in e health care services which involve medical data collection, aggregation, data transmission and data analysis here entire monitoring lifecycle and essential services component have discus as well as design challenges in designing the quality and patient centric monitoring scheme along with potential solution.
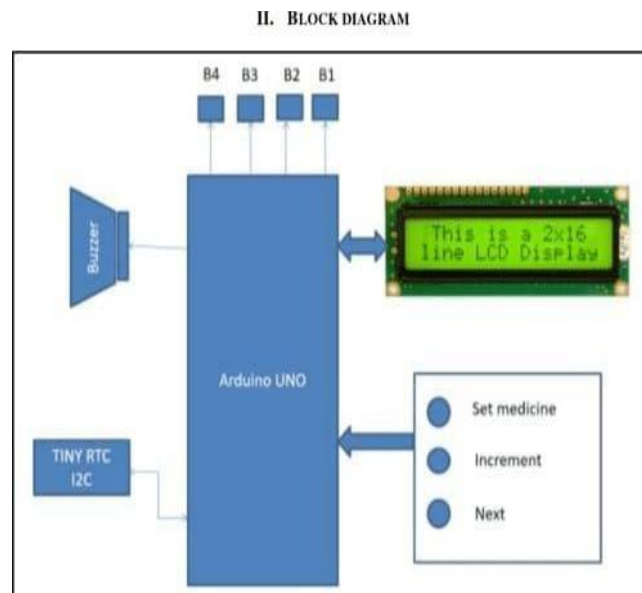
Block diagram

Fig. 1: Block Diagram of System

III. Explanation

1. Arduino UNO: We are using Arduino UNO because it use 8 bit microcontroller ATmega328P and it has 32KB flash memory. These features are beneficial in our project and that's why we used Arduino UNO. Arduino UNO board is connected with all other modules also it controls all other modules & made the interfacing easier. It also has internal EEPROM which stores real time data in it.Our project is based on embedded system we are using Arduino Uno for interfacing all things In that Arduino is an open-source which is easy- to-use hardware and connected software. So Arduino is path between hardware and software. Arduino boards read inputs from a press a button- and turn it into an output, turning on an LED and buzzer, you can tell your board what to do by sending a set of instructions to the microcontroller of Arduino. To do so you use the Arduino programming language , and the Arduino Software (IDE), based on Processing. The programming platform is Arduino IDE and programming language is standard C. we made program for all different module that we are using in our project. Like RTC module, LCD module 16*2 so firstly we have to add library in Arduino IDE software and after that we made programming.

2. LCD interfacing: We used 16*2 LCD module in our project which is connected to Arduino UNO through a LCD interface IC or directly to its address and data bus and few control pins. LCD shows the current

time and date which RTC sends the data to LCD module.

3. **RTC module**: We used Tiny RTC I2C module which uses I2C protocol and it is useful in our project. RTC module has internal CMOS cell so it does not needs external power supply to update time and date.

Tiny RTC module is based on the clock chip DS1307 which supports the I2C protocol. It uses a Lithium cell battery (CR1225). The clock/calendar provides seconds, minutes, hours, day, date,month, and year information.

4. **Buzzer**: Buzzer will ring at proper time when pills have to be taken.

A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications.

5. **LED**: We have 7 boxes having an LED in each box which blinks to show us the specific box from which the pills needs to be taken at given time.

Light emitting diodes (LEDs) are semiconductor light sources. The light emitted from LEDs varies from visible to infrared and ultraviolet regions. They operate on low voltage and power. LEDs are one of the most common electronic components and are mostly used as indicators in circuits. They are also used for luminance and optoelectronic applications.

6. **Pushbuttons**: We used 3 push buttons from which first one is used for setting medicine, second one is used for increment and third one is used for next. First button takes us to the menu of setting medicine, second button is used to increment the number of hour and minute which we needs to set and third button takes us forward from hour to minute and from minute to the next time.

Push button works just like a switch works. It is used to give user input to the microcontroller.
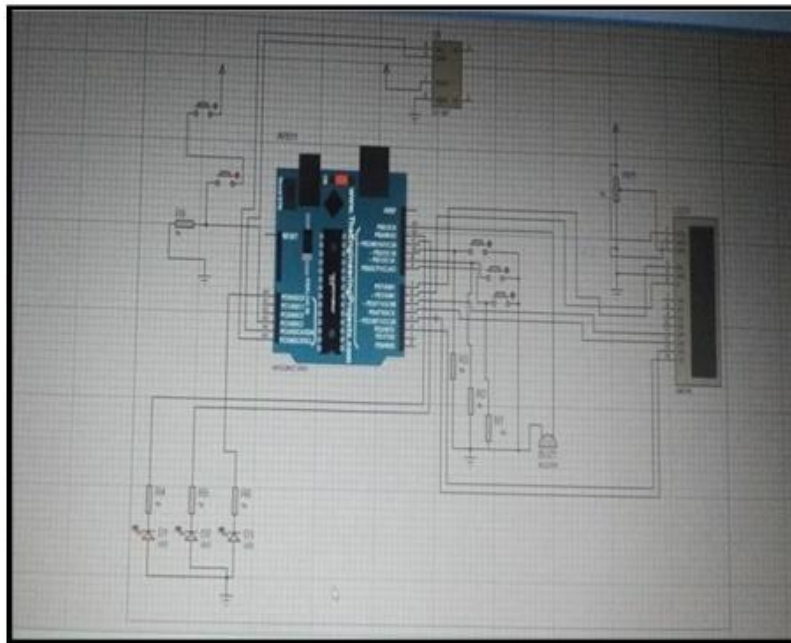
Schematic Diagram

Fig.2 Schematic diagram

Sr. No.	Pin	Working
1	A3	Input
2	11,12,13,A0,A1,A2	Output
3	A5,A4	RTC
4	8,9,10	Push button
5	5V	VCC
6	GND	GND

Table No.1

Schematic Operation:

We made schematic in software PROTEUS 8 and will check simulation in it. Firstly we add all part from library of Arduino, LCD and RTC module. We also add other part registers, LED, Buzzer etc. Power supply is applied to the Arduino module. All modules including RTC, LCD, Buzzer, LED, etc are connected with Arduino. We used Arduino Uno in system. RTC is always working whether external power supply is applied to it or not. RTC module contains a 3V CMOS cell. We also connected certain boxes in which user will load the pills. When system gets started time and date will show on LCD module.

Through push buttons we can enter in the menu of setting time of pills prescription. Using another push buttons names increment and next we can set the time of prescription of medicine. At the time we set, buzzer will rang and LED's will blink in the desired box notifying the user to open that box and take out pills from that box in which LED blinks. Buzzer and LED will turn off when user opens the box otherwise buzzer and LED will continuously notify until the time is passed of taking medicine. If the user open and closes the box immediately, system once again starts generating loud sound and forces the user to take pills again.
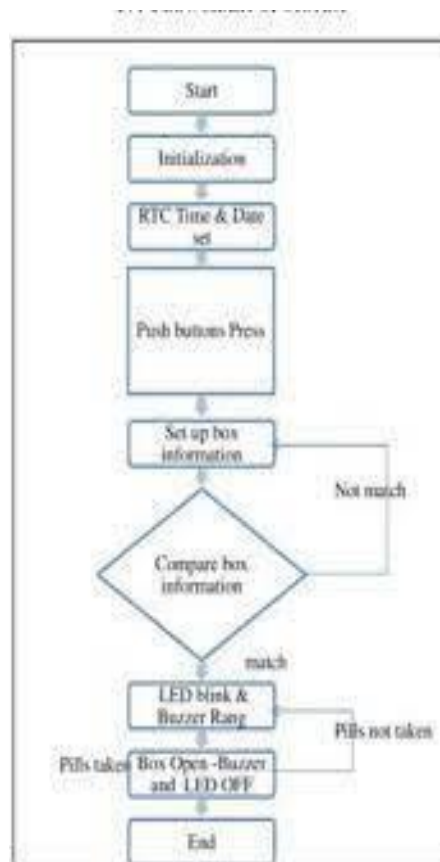
Flowchart

Fig. 3: Flowchart of System

As shown in flowchart when time & date are set through push buttons, devise will continuously compare the real time & set time. If the time is matched, LED will blink & buzzer will ring. It then senses the box is opened by the user or not. If box is opened, LED & buzzer stops and if it is not opened, LED will continuously blinks & buzzer will continuously rings.

Simulation

Proteus 8 is a single application with many service modules offering different functionality (schematic capture, PCB layout, etc). The wrapper that enables all of the various tools to communicate with each other consists of three main parts.

User gets help instructions on display > User selects time slots (once/day, twice/day, thrice/day) > Print confirmation message on display > Time keeping started > Buzzer and LED starts when time matches with user selected slot > User stops by pushing a stop push button > End
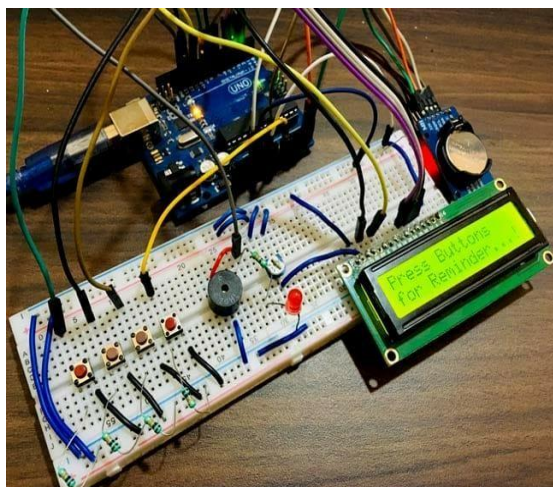
IV. Result

Fig.4 Test setup

We made our project as useful for the patient who needs this and all related users. We conclude result that our project is useful for those people who are taking pills regularly, prescription of medicine is very long and hard to remember for those users. Our product is so useful that it can cure those patients illness and there will no need of taking care of these types of patients so caregiver has no tension about their health and they will live healthy and tension free life.

Advantage
1. **Cost efficient**: Our product cost is affordable compare to other product available in market.
2. **User friendly**: User can set time table of medicine by himself.
3. **Highly reliable**: Good in quality and performance; able to be trusted for patients & old age people.
4. **Provide comfort and health**: Comfortable for old age people and provide healthy life for patients who are regularly take medicines.
5. **Long-Lasting**: The product can be used for long time

Future Scope
In the future, we hope that the application can be to linked to med karts, if the tablets are empty it directly sends a prescription message to the med kart in which they can help us delivering the prescribed tablets to our door step. Scanning of prescription to load the app can be done using image processing technology.

V. Conclusion

The goal of our project is to provide healthy and tension free life to those users who are taking regularly pills and to provide this product at affordable cost also. Our project is also reusable by exchanging those other medicine box that has only alerting system and are nonusable or unaffordable compare to our product.

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