

Mediminder: IoT Based Smart Medicine Box

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Abstract - Patients who suffer from loss of memory, such as elderly patients, may neglect to take the right medications at the right time. This all is effect proliferation of technologies and lifestyle. Due to busy schedule or sometime laziness people have irregular intake of medicines. Elder patients forget to take right medicines at right time. Also, some people tend to miss some of their medicines due to very long prescriptions which are hard to remember and confuse patients. Resulting in the ineffective of the treatment. We saw these problems in hospitals where nurse forget to give medicine to patient because they have so many people in ward, thus based on these problems we made IoT based smart medicine box by which they can set timing of medicine. And whenever the patient forgets to take their medicine it reminds them by alarming a buzzer. Also, the LED lights present above various compartments will guide the patients to take the right medicine at scheduled time.

Key words: Internet of Things (IoT), Buzzer, PCB, LED, LCD Display, Smart medicine box

1. INTRODUCTION

Over 80% of adults over the age of 50-60 years receive prescriptions for medicines that they must take 2-3 times a day. With the rise of vascular diseases and diabetes among the elderly, proper medication taking has become the number one priority for healthy living. Among those people, 40-60% are prone to forgetting to take their medicine at the right time, and in the home, patients must take the right doses at the right time. Because of different reasons, even young people who were previously trained to take care of elderly people at home can forget, which may cause a prolonged recovery period. Old people may accidentally take the wrong medicines or doses, which may cause severe complication. As such, it is imperative that the patient take the correct medicines at the exact dose and time needed. In this technological age, developing electronic devices is an efficient way to solve the above problems.

So we proposed to design a smart pillbox in which a sealed airtight box was used to keep medicines fresh. This device consists of different compartments connected

together with color LEDs that are sealed beneath the box, and it contains a LCD display and voice alarm system. When the alarm sounds, the LCD display shows the correct medication that the patient should take. The LED helps the patient or others to select the medicine based on the user-preprogrammed time that is kept in the designated compartment. This project aims to produce a low-cost design and construction of an automated medicine box that will aid people in taking their medicines at the right time.

The Smart Medicine Box is developed to ensure medicine intake by patients. Using website, users can setup timing of the medicine intake of their parents and elders.

1.1 Objectives:

- To provide decrease dependency of the user.
- To reduce efforts of user.
- To complete the medication course efficiently

2. LITERATURE SURVEY

“AN IOT BASED INTELLIGENT MEDICINE BOX” The wireless sensor network (WSN) with Zigbee modules and an intelligent home monitoring software system to collect sensor data and analyze data comprise the system's overall architecture. [1].

“A Smart Medicine Box for Medication Management using IoT”- The Peltier module is designed to generate a lower temperature for drug storage., During the course of the application, the user can send a Short Message Service (SMS) to their relatives, guardians, and doctors using a GSM or GPRS module. [2].

“Intelligent Medicine Box For Medication Management Based On Iot”- The pill box is fitted with infrared sensors (IR sensors) that are used to measure how many times the pills are taken from the box. A RTC module is attached for real-time monitoring and to update the system with the correct time. The RTC module sends time and date, while the temperature sensor sends temperature. An LCD interface is present to display both temperature and time from the temperature sensor. [3].

“An Interactive Pill Box using IoT”- The device also provides notification features like LEDs, buzzer, voice alarms, and Android applications such as which pill needs to be taken, the remainder of the medicine times to the patient/caretaker, and alarms by IR (Infra-Red) sensor, camera, and RFID tags to make the system smarter.. [4].

“Smart Medicine Box System” This system has two fundamental features that are illustrated in this paper: safety, which protects the patient's health, and good functioning. Patients' parents can also monitor the system as it is linked to a mobile phone application. The user will be alerted of the number of remaining pills, and alarms will be triggered when the patient does not take the required number of pills by using this application to determine the weight of each pill, to set the schedule of medical intake, and to generate alarms when the patient does not take the needed number of pills. [5].

“Bidirectional Smart Pill Box Monitored Through Internet And Receiving Reminding Message From Remote Relatives” A smart pill box for the elderly and nursing homes meets the needs of the market by combining electronic technology with network capability. This study uses the Webduino module included in SPB to send two-way messages with remote relatives via internet of things (IoT). The module reads the kit's sensing signal and uses WiFi to send the signal to a WiFi router before sending the medication information to a remote webpage or cell phone for monitoring (on LCD). The smart interactive pill box will be important for medical management for older persons of this aging population or in the future. [6].

“A smart pill box with remind and consumption confirmation functions” - Population aging is a global problem that affects many developing countries, including Taiwan. The natural decline in physical function with age leads to an increase in the incidence of several chronic diseases among elderly people. Generally, patients with chronic diseases have to take medications for a long time to stabilize their conditions. This paper presents a smart pill box equipped with a camera and based on the medicine bag concept to help ensure that patients consume the right medication at the right time. The pill box is linked to the matrix barcode printed on the medicine bags to perform pill reminder and confirmation functions. [7].

“Smart Medicine Box Using IOT”- It calculates how many times each box should be opened, and if no touch is detected, the touch sensor will be set to "non-taken medicine," which is stored in the cloud. [8].

Review paper on IoT Driven Smart Pill Box- Using blynk android application patients, relative ,doctor can monitor pill box from all over the word. [9].

Review on Smart Pill Box Monitored Through Internet with Remind, Secure and Temperature Controlled System - Finger print sensor authenticates the finger of that authenticated person, sending a signal to the servo motor, which opens the smart pill box. By resetting the button, tablet information is uploaded to the cloud platform, and an excel sheet is produced to see the consumption detailed number of tablets used by a person. The app sends an alert and SMS to the user when the patient or elderly people do not reset the button by the scheduled time. There is an emergency button that can be used in an emergency – it is pressed by the patient and an SMS is sent to the mobile app. [10].

3. PROPOSED WORK

Each medicine box will have its own set of timing information which will be compared to a real-world clock. There are total 4 compartments in our box. We have also hosted website where Timing can be set. If the information matches, the buzzer will go on and thereby remind the patient to take his/her medicine. Our Box is airtight so, medicine will not be in bad condition.

3.1 Software Requirement

1. **Operating System** : Windows 10

2. **IDE (for PCB designing)** : PROTEUS 8 Professional

3. **Software (for LCD Programming)** : Arduino

4. **Code Editor** : Visual Studio Code

5. **Language** : Arduino, php, MySQL, HTML5, CSS3, JavaScript & Bootstrap

3.2 Hardware Integration

1. **WI-FI Module** : NODEMCU - ESP8266 Wi-Fi CP2102

2. **LCD Module** : I2C 16x2

3. **Voltage Regulator** : IC 7805

4. **Other Parts**: Capacitors: 1000U/25V, 100U/25V, Resistor:330E,LCD16x2, Buzzer, Heat-Sink

3.3 Flow of the System:

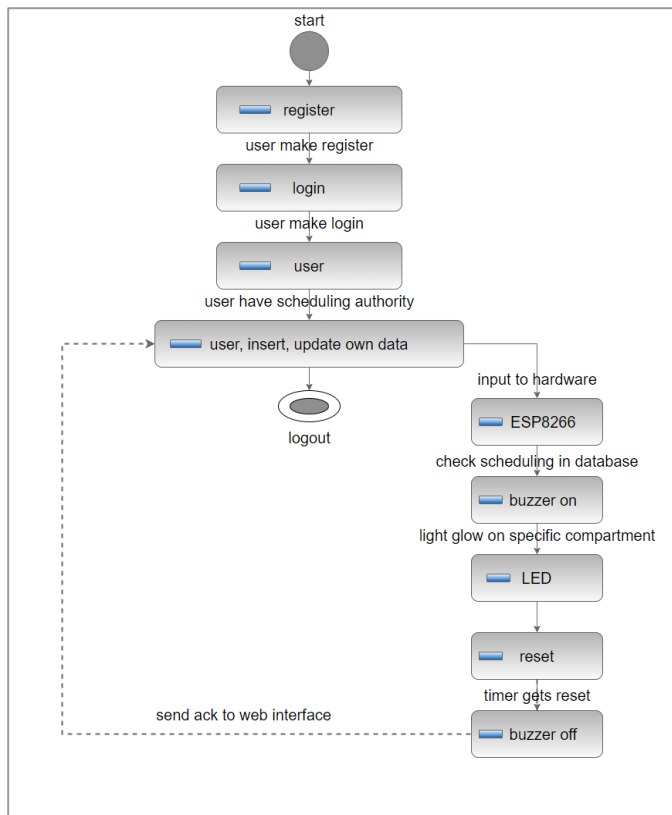


Fig. 1: Flowchart

3.3.1 For hardware:-

1. Connect the AC power supply to the box.
2. Switch on the medicine box by lifting the liver.
3. Turn on the WiFi, and make sure it should be available for connection.
4. Now the device will automatically connect to the WiFi, and hardware is ready to use(i.e. hardware is online).

3.3.2 For Website:-

1. Visit the website
<https://mediminder.000webhostapp.com/welcome.php>
2. Create account or Sign up.
3. Login to the website.
4. Now schedule the medicines according to their time.
5. Update the events and it will remind about medications.

3.3 Modules:

The whole system is divided into four modules

- i. Design of Hardware
- ii. Implementation of software
- iii. Integration of software with hardware
- iv. Deployment of website on server

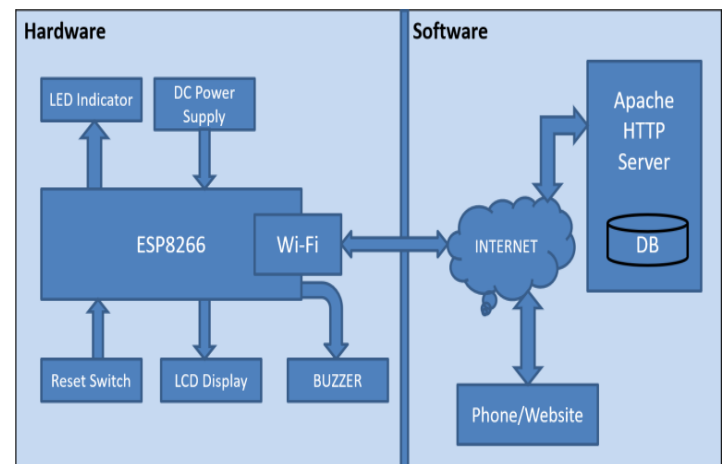


Fig 2 . Architecture

1. Design of Hardware

In these module we will do the soldring and connection of various hardware components on Printed Circuit Board. Here we will also attached the PCB, Leds and LED Display in our medicine box and test the working of each component. Also the designing of PCB is done for which we will use the software Proteus 8 Professional.

2. Implementation of software

In these module we will make the user friendly website for the user to schedule the medicine dosage time for medicine box. Here in frontend we will use the technology such as HTML5, CSS3, Bootstrap, Javascript etc. and for the backend we will use the technology such as PHP, Apache HTTP server, MYSQL etc.

3. Integration of software with hardware

In these module we will fetched the data which user enters in the website. When the user schedule the medicine dosage time then the data will directly get stored in the cloud database. The data stored in the database is in the form of bit string("0000"). When the dosage time occur the bit string of the respective component become "1" and when the bit string become 1 the hardware will glow the LED and Buzzer of the respective compartment.

4. Deployment of website on server

After successful testing of the hardware and the software separately and checking of all component working, we will deployed the website on the free hosting platform 000webhost.com

4. SCREENSHOT

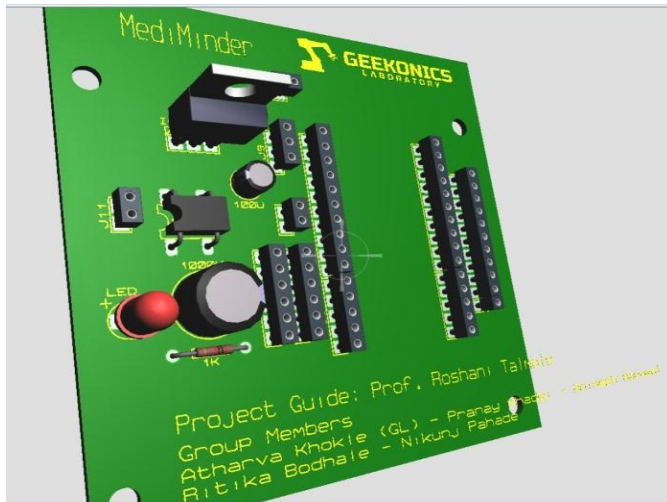


Fig 3 . 3d Representation of PCB

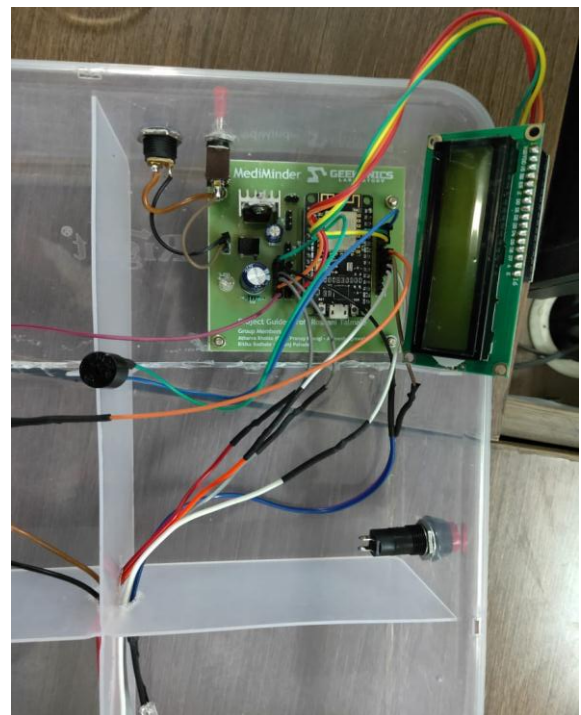


Fig 4. Project Kit

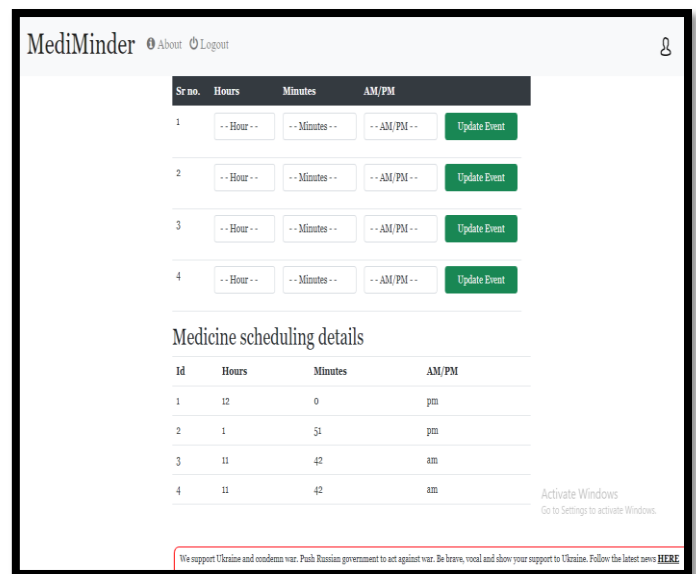


Fig 5 . Web interface

5. CONCLUSION

We have designed an IoT based smart medicine box by applying engineering knowledge to help people take medicine on time. By this kit Caretaker will remain tension free about giving medicine to patient. Some medicines have to follow strict timing. So, this kit will make medicine course efficiently.

6. REFERENCES

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