

Intelligent Pillbox for Monitoring the Health using IoT Concepts

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Abstract - Most elderly people live alone, some of whom suffer from a disability, which makes it difficult to take care of themselves. Delays in taking their medication or at the wrong time can lead to potential health problems. The present paper design of an Intelligent Pillbox for monitoring a health reminder of pills for the patient at anywhere using Internet of Things (IoT) concepts. The invention is generally focused on the remainder of taking medicine, which is associated with health caring/monitoring, a modern precaution wellness IoT Platform with an intelligent pillbox along with sensors for health inspector is proposed here. The proposed Intelligent pillbox can be used by the patient as well as a caretaker to monitor and ensure that the correct dosage of each medicine is being taken at the right time. Intelligent Pillbox provides audio instructions to alert the user when a certain medicine is taken or refilled. The functions of Pillbox are: which pill to take, a timely reminder when the patient must take the pills, and notify using android Application, and LEDs, Buzzer and Voice alarms. In cases where the exact timing of the pill is necessary, the application of Pillbox helps patients, especially informing them about their pills taking time.

Keywords: Pillbox, Wifi Module, IoT, Arduino, Android Application, Alarm Notification.

1. INTRODUCTION

Nowadays, people who are constantly in need of help can be our family members, physically disabled, blindness, etc. The elderly people are affected by taken by pills. Many patients suffer from blind or short-term memory. Many people forget to take medicines at the correct time, and this can affect their health. Intelligent Pillbox is a helpful solution that makes it easier for patients to take their medications. The importance of having a solution for medicine is emphasized in the case of short-term memory, blind persons or patients who forget to take medication every time.

Recently developed application has its feature but they won't work efficiently in society due to their complexity and heavy cost. Users cannot use pillbox individually just because of their cost and cost of maintenance. Some of the pillboxes remind and monitor without any interaction with your family members like alert and indication. There is some drawback observe in a modern developed smart box.

The proposed system for the intelligent pillbox where user application and pillbox help to remind such kind of people who forget to take medicines. In this system, we use two major parts one is software and other is hardware. In the Software where we mobile applications like android

which uses for alarm and set a reminder for taking pills on time. We also implement add the pill with their box no likewise. So normal people can also interact with the system hence we reduce the special person interaction to save the cost of maintenance. In a Hardware part, we used the Arduino for hardware interaction and Wi-Fi module for the transmission cloud data storage.

2. MOTIVATION

The motivation for building such a product came from observing the elder person in the family suffer from the distress of missing out a pill. In society blind people can't take medicines, all these happenings motivate us to come up with a solution.

3. LITERATURE SURVEY

[1] A pillbox based on a MCS-51 micro-controller was proposed that pillbox is sent out medicine using a stepper motor at a scheduled time, but there is no provision to record the time when the patient took the medicine. [2] An electronic pillbox called MedTracker is proposed in the MedTracker, the time at which each lid is opened or closed is recorded, and transmitted to PC via a Bluetooth link. [3] On a pillbox When the alarm system work at that time, the specific compartment door is automatically opened by using a step motor, which is controlled by the Arduino.[4] This activity when the door opens. That time, the LCD display shows information about the patient. [5] This paper uses the Arduino Mega 2560. [6] This pillbox we are used to the camera on the inner side of a cover to detect the matrix barcode and tablet bag. A user is reminding for that time we are used to the Alarm function. [7] Suppose the patient misses the medicine then the doctor and family member send it to an SMS notification. [8] Whenever the patient opens the wrong compartments. That time LED on correct box compartment choice.[9] A Bio-patch for use to monitoring of the patient and Audio playback IC to give alert in a voice message like patient take a medicine etc. [10] This prototype contains; a use to the alarm system with an automatic opening and closing the box, an interactive doctor and family members then notification system through GSM network. This pillbox connectivity sensors and other healthcare devices (lot) play an important role in the care of patients take a medicines particular period because it allows getting access in real-time medical information to a patient.

4. PROPOSED METHODOLOGY

To ensure people consumption medicines on schedule, here develop an intelligent pillbox schedule. In Intelligent

pillbox the mobile app, node MCU / Arduino, voice recorder, speaker/buzzer, LEDs, Vibrator, IR sensor RTC. The Node MCU / Arduino is used as a microcontroller to control all sensors or particular events.

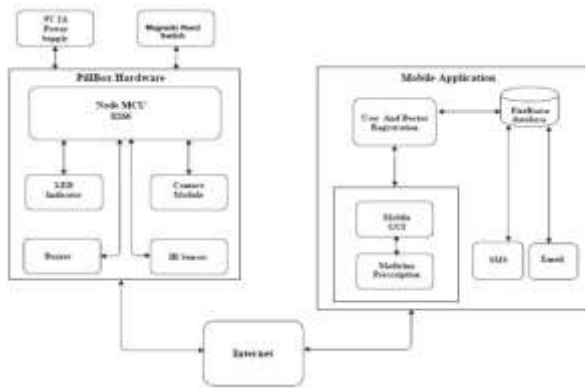


Fig. 1 System Architecture

Fig.1 Shows the Architecture of Pillbox. This Architecture consists of Pillbox Hardware and Mobile Application.

4.1. Pillbox Hardware: The Pillbox is wirelessly connected to the internet. The Pillbox is come up with different compartments for storing the Pills. The Pillbox Hardware consists of Node MCU 8266, LED indicator, Camera Module, IR Sensor, Buzzer.

Node MCU 8266: NodeMCU is an open source Lua based firmware for ESP8266 WiFi SoC in Expressive and uses an on-module Flash-based SPIFFS file system. The nodeMCU was implemented in C and layered on the espresso non-OS SDK. There are Arduino on the boards of NodeMCU DevKit, such as analog (i.e. A0) and digital (D0-D8) pins. It supports serial communication protocols that is UART, SPI, I2C etc. Using such serial protocols, we can connect it to devices like I2C enabled LCD display, magnetometer HMC5883, MPU-6050 Gyro meter + CE chronometer, RTC chip, GPS module, touch screen display, SD card and so on.

LED Indicator: An LED on top of each compartment denotes the correct box .it is used to provide a visual notification to the user.

Camera Module: the camera is placed on the inner side of the Pillbox to detect the Pills are taken or not.

IR Sensor: The IR sensor is used to detect pills in the compartment, the sensor is used to detect the status of the door of the compartment.

Buzzer: The Buzzer is used to provide an audio alarm in addition to the LED in order to notify the user when to take the medicine. The buzzer might also give an advantage for blind people when using Pillbox.

4.2. Mobile Application: The Pillbox App (Android Application) is installed on the patient's Mobile phone. With

this Pillbox App, patients could view their prescriptions and get notifications regarding medicine intake.

Keep track of the number of pills in each compartment - Alarms the user if a certain medicine needs to be refilled, Alert the user through the LED and buzzer at the time to take a certain medicine. The phone application will also send continuous signals to lock or unlock the medical box based on the schedule of the medicine intake or an order given by the user.

The whole information is stored in the Firebase Database, the patient data can be accessed only by the doctor.

4.3. Firebase Database: A database is used to store the information of each compartment and user, doctor data. The following are the main fields stored in the database table; pill name, number of pills to be taken per day, time of dose, and the total number of Pills. And Send SMS and Email Notifications to the user based on pill status - Update the status of each compartment depending on usage.

The main program can be used by two types of users, the patient, and the administrator. The patient, when logged in, can only view and read the Pillbox information. While the administrator can view, add, and delete the pill information. The mobile application informs the user of the updated status of the Pillbox.

Fig.1 shows the GUI of the mobile application. Each compartment will display the number of pills and a prescription to take pills.

3. CONCLUSIONS

In this paper low cost efficient intelligent pillbox develop by using the mobile application and electronic devices. Cost and Power efficient device help to people took their medicine who forget pill frequently. Voice command and alert for the blind person also implement indicators for blind people of the correct pillbox using the vibrator.

The intelligent pillbox store the data of the particular patient to analyses their overdose or frequency of forgetting a dose.

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