

IoT-Based Pill Monitor and Reminder for Medication Intake

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Abstract: Prescriptions can treat and prevent sickness. They needed to take their medication regularly to maintain proper levels. Taking drugs as recommended and following treatment programs are key to treating chronic diseases and preserving long-term health and well-being. Most people don't take their prescriptions as prescribed because they're too busy or forget. This project attempts to design an ESP32-based IoT pill monitor and reminder. It also creates a Blynk notification system. Most target Android users. This paper discusses a Blynk-based pill monitor and reminder box. The prototype includes an infrared sensor, ESP32, and a buzzer. Sensor sensitivity can be tested in multiple ways. Blynk's input is infrared sensors. The sensitive infrared sensor can relay data to Blynk in 0.1 seconds. An infrared sensor recognizes a patient's hand in 0.1s, silencing the alarm. Like Blynk's time-based notifications, the buzzer will sound when coded. The findings of the tests indicate that the project can carry out its intended functions and provide the desired outcomes.

Keywords: Medication, ESP32, Blynk, IoT

1. Introduction

Today's busy people focus more on work and neglect their health. Maintaining regular medication is difficult for both older and younger people. Physical, mental, and social well-being are all called health. Diseases like high blood pressure, diabetes, and others need regular checkups and medicine and will worsen if ignored [1]. For many patients, it is hard for loved ones to remind them of their well-being or regular medication intake. Patient forgetfulness is one of the most common causes of non-compliance with drug regimens. In addition, as a person ages, the number of medications prescribed by medical professionals and the frequency with which they must be taken grow [2]. Patients will take their medication at the incorrect time to be certain.

Any technological advancement created by humans has always been associated with health risks. Numerous obstacles, such as language limitations, prevent individuals from receiving the assistance

and treatment they require, making the need for technology in health care vital. Due to technological improvements, we can now observe how fitness software and step counter watches have improved people's health and well-being. It can interface with various sensors and microcontrollers, communicating over the Internet. A protocol enabling the devices to communicate with one another and s has been devised. Since patients' health care expenses and quality of life are increasing, as well as the need to ensure that patients receive correct treatment to lengthen their lives, Internet of Things technology usage is growing. Even though numerous types and styles of pill boxes have been developed in the modern era. Most of the pillboxes only support the Android interface, making life difficult for IOS users [3]-[5]. We have targeted patients juggling a job, ageing, and other obligations by utilising the Pill Monitor and Reminder. There are many types of pillboxes that have been designed [6]-[8], but most of them are the same usage with no inappropriate pillbox to store the medicine. This Pill Monitor and Reminder will ensure that patients take their medication on time and that the supply of medication drugs is sufficient. Pill Monitor and Reminder are compatible with Android and IOS interfaces, which could boost the number of users.

2. Materials and Methods

ESP32 was chosen to serve as the microcontroller for this project. The status of this project may be checked using Blynk Apps, and push notifications can be delivered using a mobile device. The monitoring area can determine whether the patient took their medication at the appropriate time and whether there is a sufficient supply of pills for the patient.

2.1 Hardware Development

Specifications and properties of materials, equipment, and other resources used in the current study was described in this section. The following list is the components that are used for this project and shown in Figure 1:

- Infrared Sensor
- ESP32
- Buzzer
- Acrylic Glass

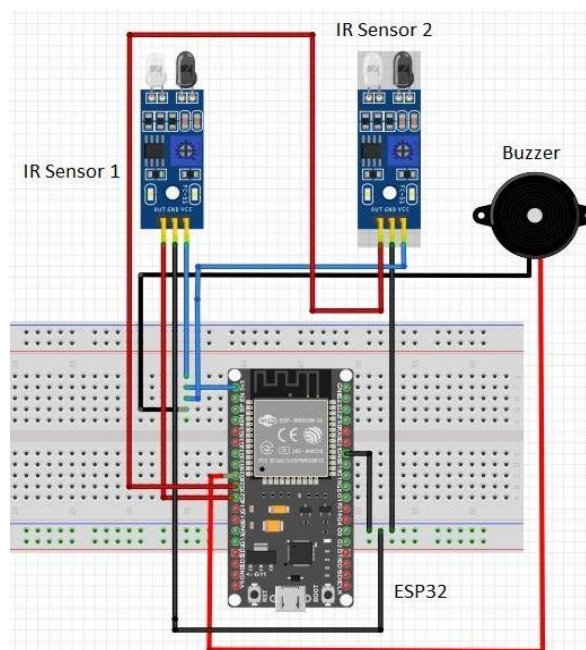


Figure 1: Connection of component

2.2 Software Development

The Arduino IDE software is utilised while developing the project's software to create and upload code to the microcontroller board. ESP32 is the name of the microcontroller. When writing the code, the algorithm needs to be able to do what the system is trying to do.

The Blynk interface can be designed on the webpage and phone applications. This makes it easy for the user to create and monitor from anywhere at any time. Figure 2 shows the interface of the Blynk App based on this project.

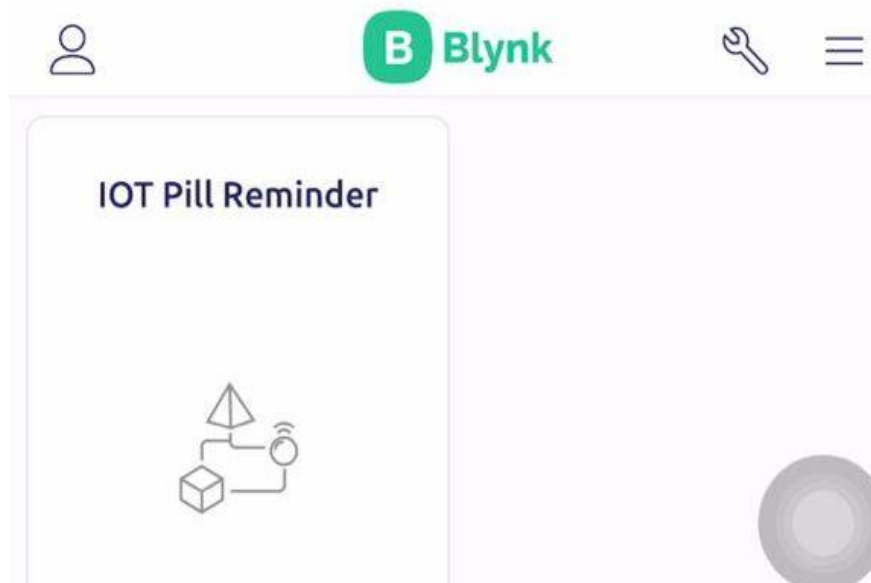


Figure 2: Blynk interface

2.3 Methods

This pill monitor and reminder check for drugs and reminds users to take them. The medicine's availability depends on two factors. The indicator will show that the container is full if there are enough pills. The app will discrieterio notice when the second criteria is met, such as when the pill box is short on medication. Second, either the patient or the caretaker must select the medication schedule. When the time is up, the buzzer will sound for a minute. The patient must have taken their medication, and the buzzing must have lasted one minute before it is muted. The program will tell the patient's caregiver if they don't take their medication as advised. The following Figure 3 shows the flow of the project.

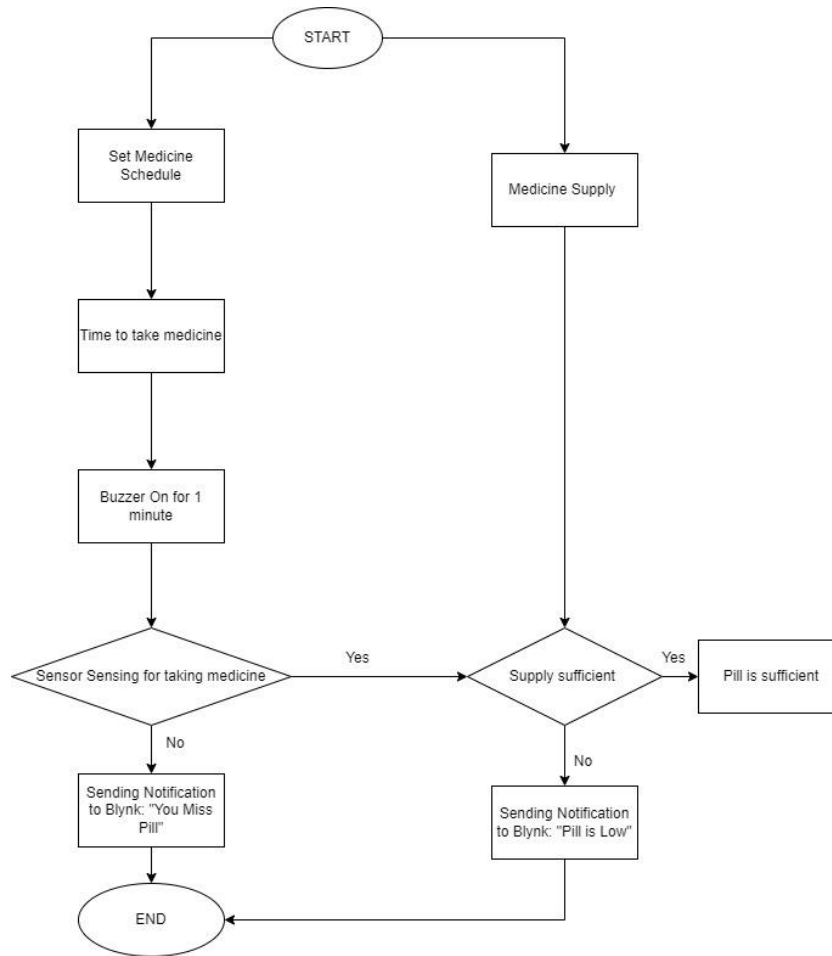


Figure 3: Flowchart of pill monitor and reminder

2.3 Parameter for pill and pill box

If the pill is excessively big, it will be hard to store. The Panadol Actifast was chosen because of its accessibility and equal dosing. Panadol Actifast is 1.8 to 2.0 centimetres, according to the study. On an A4 sheet of paper, the perfect pill box's measurements are drawn. Cut acrylic glass to size with a table saw or a sharp blade. Standard glass cutters generate visible scratch marks and demand a lot of energy. Figure 4 shows the prototype pillbox and its dimensions.

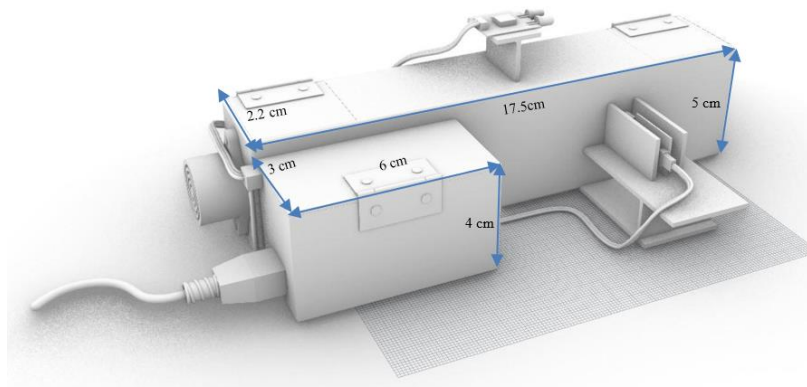


Figure 4: Prototype of the Pillbox

3. Results and Discussion

For this section, the system's output is presented step by step in three categories. The following is the list of three different types with diagrams.

3.1 Monitoring Pill Supply

Figure 5 shows the monitoring pill supply with (a) an empty pill slot. Thus, a notification will pop out at the Blynk App to notify the user, as shown in Figure 5(b). This alerts the user to reorder medicine. If the user missed the signal, they could still acknowledge it by clicking the red warning circle.

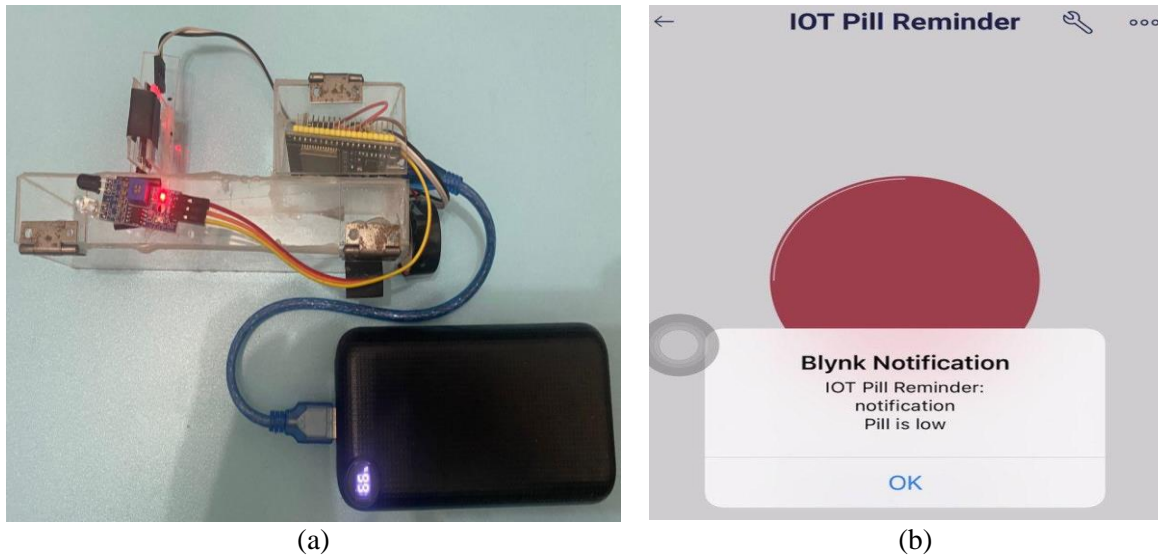


Figure 5: Monitoring pill supply with (a) Empty pill box and (b) Blynk notification

Figure 6 indicates that the pill slot is full of medicine where the infrared sensor senses the presents of the pill and will display a green circle referring that the pill supply is sufficient.

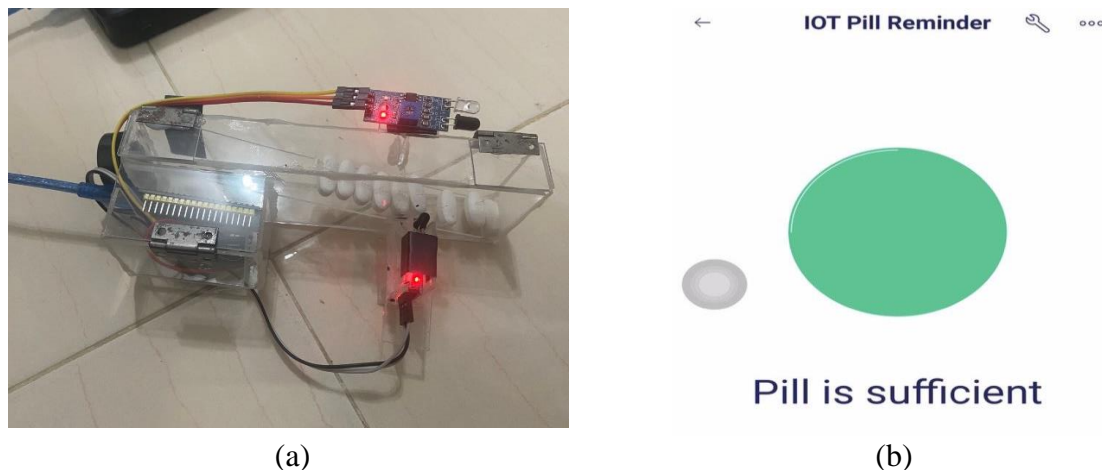


Figure 6: Monitoring pill supply with (a) Full pill slot and (b) Blynk notification

3.2 Medication Intake time

At medicine time, a buzzer will sound. Figure 7 shows 10:05 pm. Hence the bell will go off from 10:05 to 10:07. Blynk alerts you to take medicine when the buzzer rings. The infrared sensor stops the buzzer when the patient takes the therapy.

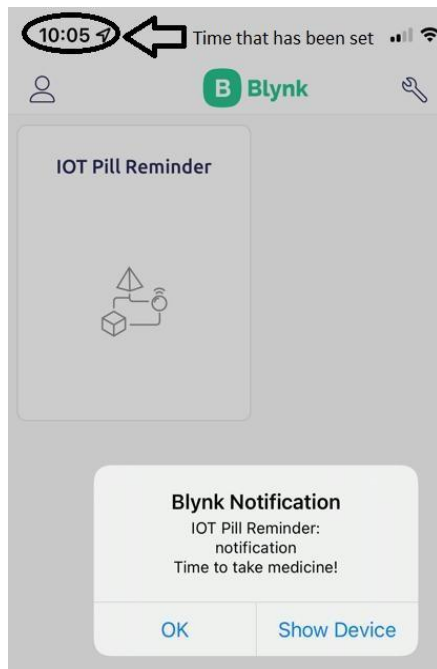


Figure 7: Blynk notification for the reminder

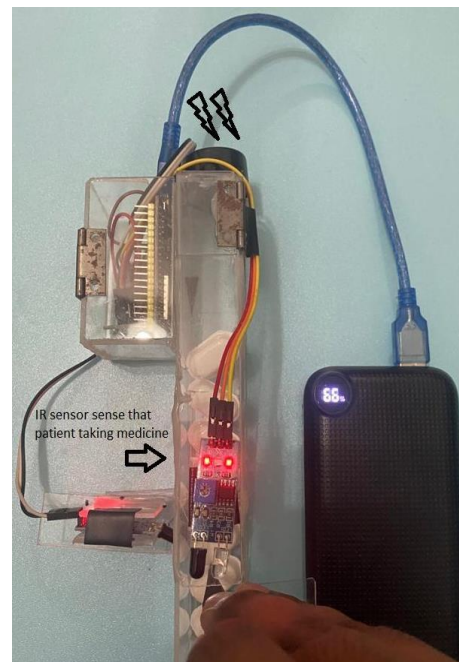


Figure 8: Patient taking medicine

3.3 Patient missed taking the pill

Figure 9 shows what happens if a patient miss taking their prescription after the buzzer goes off at 10:45, and a notification will be sent at 10:47. This will alert the user that the patient did not take their medication on time.

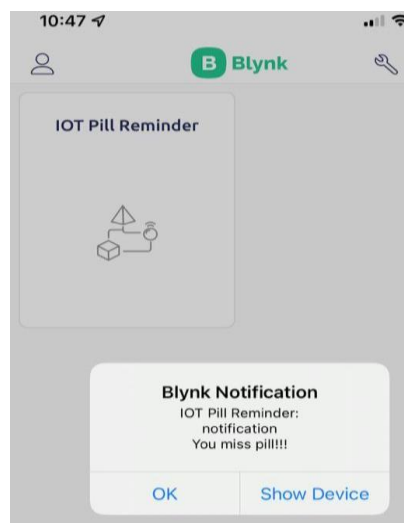


Figure 9: Miss pill notification

4. Conclusion

In conclusion, the pill monitor and the reminder have been functioning well. The infrared sensor is in good working order, as evidenced by the fact that it provides notification on the availability of medicine every minute. Additionally, the other infrared sensor can identify the presence of a patient's hand without encountering any difficulties. Regarding the buzzer, it operates precisely at the time that has been determined for the administration of the drug. Additionally, the Blynk application successfully alerts users whenever they are directed.

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