

Medicine Pillbox Reminder Using IoT Sensors

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Abstract: *In recent times IoT (Internet of Things) plays a major role in the daily routine of human life. Majorly this technology is showing its impact on medical applications. As per a report, Health issues become very common for people above the age of 40 and it becomes severe for the elderly population. Sometimes old age people forget to take medicine and also get confused about when to use what type of medicine, which makes them rely on the assistance of others. With the help of IoT, a smart device with RFID (Radio-frequency Identifier), Arduino UNO and NodeMCU is proposed. This not only helps in suggesting the kind of medicine to be taken but also the information is sent to the nearby hospital in case of emergencies. The proposed model achieves an accuracy of 92%, which is very much essential in present days.*

Keywords: Internet of Things (IoT), Arduino UNO, NodeMCU, Smart Device, Medical Field.

I. INTRODUCTION

Due to the advancement in technologies, human life expectancy is getting increased. Curable diseases considered as noncurable are getting cured with the usage of one or more drugs. For this, patients get instruction from the doctors to take the medicine twice or thrice a day and also they may suggest different medicine at a different times set in a day. [1] Most older people forget to take the medicine on time and also many young people have a habit to take the drug on time. Diseases can be cured only if the suggested prescription is utilised properly. The improper usage of medicine may lead to new health complications. [2] Patients who miss medicine on time need a personal caretaker. In this process, a lot of money has to be wasted. To save the amount spent for appointing a personal caretaker and also for notifying the nearby hospitals in case of emergencies, this research work proposes an automated IoT-based technique, which not only alerts about the medicines but also notifies the hospitals in case of emergencies. [3] According to the report, there is a reduction in the percentage of patients readmission to hospitals due to the timely usage of drugs. IoT devices that are wearable give the best results for this. IoT devices with RFID give the best results. The proposed work is a combination



Figure.1 Working of IOT

II. EXISTING SYSTEM

They indeed give more preference to their work than taking care of their health. Several diseases like diabetes, blood pressure is nowadays very common. Maintaining daily medication become very difficult for old people. Sometimes younger are faced with the same problem. Many people in our family need constant help may it be our elderly people, younger or others. But it is not always possible for us to remind them of their medicine dosages every time. For this purpose, there needs to be some facility for us which monitoring a patient and take care. Nowadays we are all used to living technology-based life. We can use this technology in a way that will be beneficial for us. Cell phones aren't best

utilized for calling but now may be used as an ensemble of embedded sensors that together allow new packages including human services, healthcare, social networks, environmental tracking etc. But it is not always possible for us to remind them of their medicine dosages every time. For this purpose, there needs to be some facility for us which monitoring a patient and take care.

III. PROPOSED SYSTEM

The proposed system can consist of the following components of IoT devices: Smart pillboxes or medicine dispensers that can be connected to the internet and programmed to dispense medication at specific times. Mobile application: A mobile app can be developed to communicate with smart pillboxes or dispensers and allow users to set reminders, receive notifications, and track their medication schedules. Cloud platform: A cloud-based platform can be used to store data collected from smart pillboxes or dispensers and provide analytics on medication adherence. Analytics engine: An analytics engine can be used to analyze the data collected and provide insights into medication adherence patterns, identify potential problems, and provide suggestions for improvement. The user fills the smart pillbox or dispenser with their medication and sets the schedule for when they need to take their medication. The smart pillbox or dispenser communicates with the mobile app, which sends reminders to the user's smartphone when it's time to take their medication. If the user misses a medication dose, the smart pillbox or dispenser can notify the mobile app, which can send an alert to the user's caregiver or healthcare provider.

The data collected by the smart pillbox or dispenser is stored on the cloud platform and can be analyzed by the analytics engine to provide insights into medication adherence patterns. The system can also provide personalized recommendations to users to improve their medication adherence based on their medication history and adherence patterns. Overall, a medicine reminder project using IoT can help individuals manage their medication schedules more effectively, leading to better health outcomes and improved quality of life.

IV. IMPLEMENTATION

An intelligent IoT-based patient reminder for a medicine reminds the patients to take the medicine when the actual time of taking medicine arrives. [7] If it has experimented with the example, the proposed model makes an alarm sound at the time of taking medicine. Further, the medical box is not opened during the time for medicine. Servo motor which is connected to the box which contains the medicine, which will not let the box open at unusual times for medicines and will automatically send an alarm signal at the time of medicine along with the sound. The alarm sound stops only when the drawer of the medical box is opened. Fig.2 shows the smart medicine box with three compartments, where each compartment is used to store each time zone for medicine.

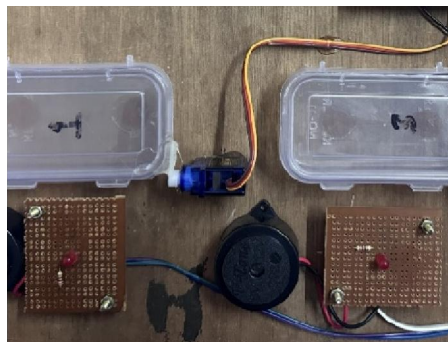


Fig.2 Smart medicine box

There are 2 modules like Arduino UNO and the other module is NodeMCU which are the 2 main components for this work which are connected. With the help of serial communication.[8,9] There is a total of 3 components which are controlled by NodeMCU which uses to control the sensor and temperature. Here sensors are connected to Arduino UNO and the 20x4 LCD connects with an I2C LCD adapter. For controlling the medical box, the input of medical details with the prescription details is kept. [10] Three components of the details of the prescription are stored. Control algorithm.

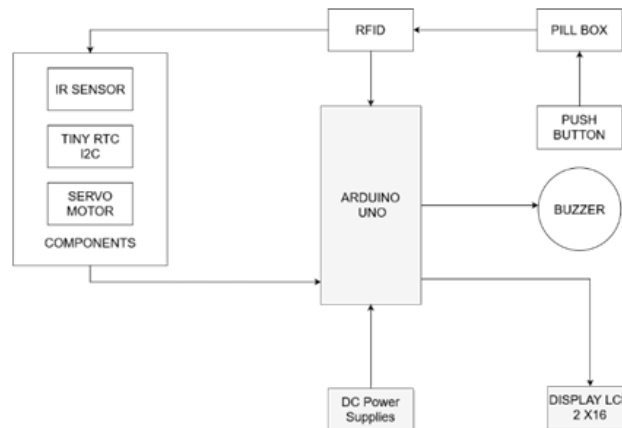


Fig 3. Architecture diagram

Figure.3 shows the Architecture diagram of the smart medicine box where Arduino UNO is connected to a servo meter, LCD, LED, and DS32321 RTC module. RTC(Real Time Check) module sends the input alarm, when the alarm time matches with the time set at RTC then the buzzer rings, the compartment gets unlocked and also sends the email. It also displays the medicine's name. Thereafter compartment gets closed [11, 12].

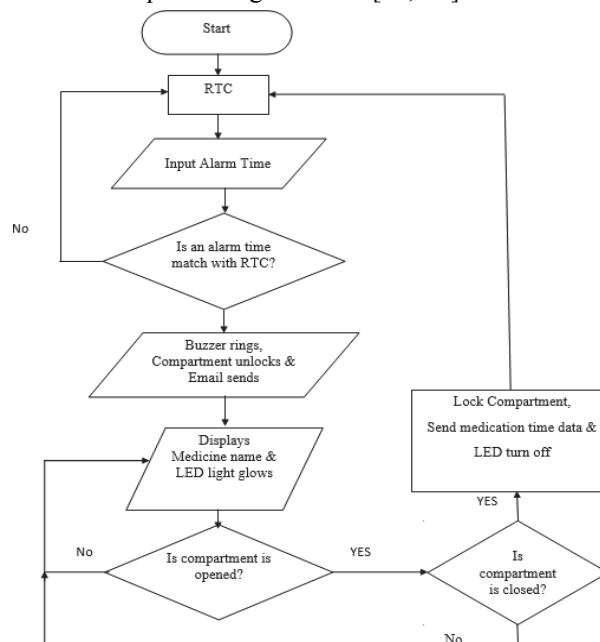


Fig.4 Flowchart of the Medication process

Fig.4 shows the flow chart of the medication process, where RTC gives the input signal for the alarm and checks the alarm time matches the fixed time for medicine. If it matches the buzzer rings the bell.

V. MODULES

A voltage regulator is an electronic circuit that maintains a constant output voltage regardless of changes in input voltage or load current. It is commonly used in electronic devices to ensure that the voltage supplied to the components remains within a specified range, preventing damage and ensuring proper operation. There are two types of voltage regulators: linear regulators and switching regulators. Linear regulators use a variable resistance to maintain a constant output voltage, while switching regulators use a high-frequency oscillator to switch power on and off, regulating the output voltage. Linear regulators are simpler and less expensive, but switching regulators are more efficient and can handle higher current loads.

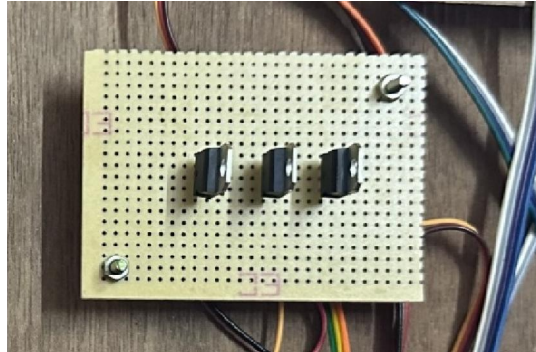


Fig.5 Voltage regulator

Voltage regulators can be found in a wide range of applications, including power supplies for computers, televisions, and other electronic devices, as well as in automotive and aerospace systems. They are also used in renewable energy systems to maintain a consistent voltage from solar panels or wind turbines. and sends the alert message to which camera he crossed.

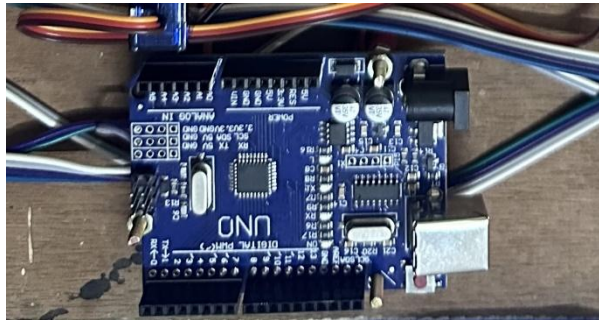


Fig.6 Arduino UNO

Arduino Uno is a microcontroller board that can be used in a medicine reminder project. The project can be designed to remind a patient to take their medicine at specific times of the day or when they forget to take their medication. To create a medicine reminder project using Arduino Uno, you will need the following components:

- Arduino Uno board
- RTC (Real-Time Clock) module to keep track of time
- Buzzer to produce an alarm sound
- LED display to show the medicine reminder message
- Buttons to set the reminder time and snooze the alarm

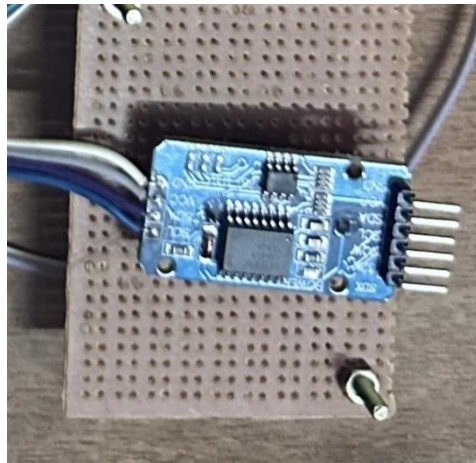


Fig.7 Arduino UNO

Connect the RTC module to the Arduino Uno board and initialize it with the current time and date. Set up the buzzer and LED display on the board, program the Arduino to produce an alarm sound and display a reminder message on the LED when it is time to take the medicine. Add buttons to the circuit to set the reminder time and snooze the alarm for a few minutes. Write the code to compare the current time with the set reminder time and trigger the alarm and message display when the time matches. Include a snooze function to silence the alarm for a few minutes and remind the patient to take their medicine again.

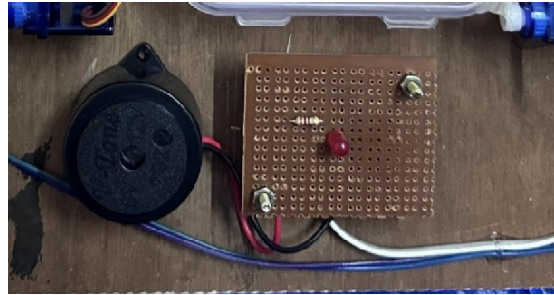


Fig.8 LED and Buzzer

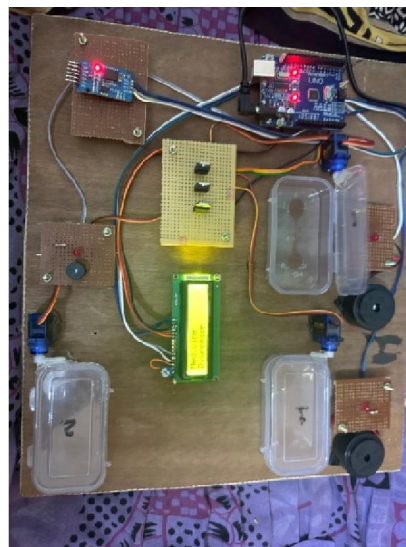
Buzzer will alert with a sound indication after the RTC induces the alert from its process and again it will be set back to other pill boxes from on its count. The patient can find it easily when it's on time to take the prescribed medicines without interruptions.



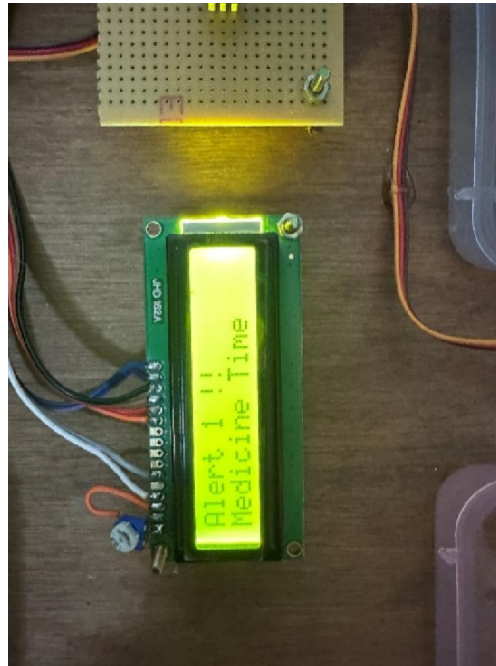
Fig.9 Servo motor

They are linear or rotatory actuators and can move to a given specified angular or linear position. We can use servo motors for IoT applications and make the motor rotate to 90 degrees, 180 degrees, etc., as per our needs. The following diagram shows what actuators do, the controller directs the actuator based on the sensor data to do the work.

VI. RESULT



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FidgetSpinner [ Arduino 1.8.10
File Edit Sketch Tools Help
FidgetSpinner FidgetSpinner.h PeakDetector.h
// ..._t_ ...
bool lastButton1;
bool lastButton2;
int currentAnimation = 0;
int currentColor = 0;

void setup() {
  // Initialize serial output for debugging and plotting.
  Serial.begin(115200);
  // Initialize Circuit Playground library and get accelerometer
  // so its widest +/-16g range.
  CircuitPlayground.begin(BASICSWISS);
  CircuitPlayground.setAccelRange(LIQUID_RANGE_16_G);
  // initialize starting button state.
  lastButton1 = CircuitPlayground.leftButton();
  lastButton2 = CircuitPlayground.rightButton();
}

void loop() {
  // update time since last loop call.
  unsigned long currentMS = millis();
  unsigned long deltaMS = currentMS - lastMS; // Time in milliseconds.
  float deltaS = deltaMS / 1000.0; // Time in seconds.
  lastMS = currentMS;

  // Grab the current accelerometer axis value and look for a sudden peak.
  float accel = AK18;
  int result = peakDetector.detect(accel);

  // if in debug mode, print out the current acceleration and peak detector
  // status (average, standard deviation, and peak result). Use the serial
  // printer to view this over time.
  #ifdef DEBUG
  Serial.print(accel);
  
```

VII. CONCLUSION

The medicine pill box reminder project is a useful tool for individuals who take multiple medications daily. It helps them to organize their pills and keep track of their medication schedules. By using a pill box reminder, patients can ensure that they take the right medication at the right time, and reduce the risk of missed doses or accidental overdose. In conclusion, the medicine pill box reminder project is a valuable aid in medication management for patients who take multiple medications. It can improve medication adherence, reduce the risk of medication errors, and enhance patient safety. Patients who use a pill box reminder are more likely to take their medication as prescribed, which can lead to better health outcomes and improved quality of life. Research has shown that patients who use a pill box reminder are more likely to adhere to their medication regimen, leading to better health outcomes. For individuals with memory impairments or cognitive challenges, a pill box reminder can be a crucial tool in managing their medication schedules.

The use of a pill box reminder can reduce medication waste, as patients are less likely to accidentally double-dose or miss a dose. Pillbox reminders can be customized to accommodate specific medication regimens, including the number of pills needed at each dose. They can also be used in conjunction with other medication management tools, such as medication trackers or reminder apps, to further enhance medication adherence. Ultimately, the medicine pill box reminder project is a simple yet effective solution for medication management that can significantly improve patient safety, health outcomes, and quality of life. By using a pill box reminder, patients can ensure that they take the right medication at the right time, leading to better health and well-being.

VIII. ACKNOWLEDGEMENT

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