

PERSONAL ASSISTANCE FOR SENIORS WHO ARE SELF - RELIANT

PROJECT REPORT

TEAM ID	PNT2022TMID17685
INDUSTRY MENTOR	KUMAR JULURI
FACULTY MENTOR	LAKSHMI SV

TEAM MEMBERS

**PRAVEEN M
RAHUL RAJ D R
VIMAL KANNAN M
VISHNU VARDHAN A**

1. INTRODUCTION

1. Project Overview
2. Purpose

2. LITERATURE SURVEY

1. Existing problem
2. References
3. Problem Statement Definition

3. IDEATION & PROPOSED SOLUTION

1. Empathy Map Canvas
2. Ideation & Brainstorming
3. Proposed Solution
4. Problem Solution fit

4. REQUIREMENT ANALYSIS

1. Functional requirement
2. Non-Functional requirements

5. PROJECT DESIGN

1. Data Flow Diagrams
2. Solution & Technical Architecture
3. User Stories

6. PROJECT PLANNING & SCHEDULING

1. Sprint Planning & Estimation
2. Sprint Delivery Schedule
3. Reports from JIRA

7. CODING & SOLUTIONING:

1. WEB UI to enter medicine name and time for intake.
2. NODE - RED feature for spending data to IBM Platform.
3. CLOUDANT to store medicine name and intake time.
4. Mobile Application (MEDVANZA).
5. Display the name of the medicine in an IOT device at the scheduled time.

6. Database Schema.

7. IBM Watson.

8. **TESTING**

1. User Acceptance Testing (UAT)

2. Test Case Analysis

9. **RESULTS**

1. Performance Metrics

10. **ADVANTAGES & DISADVANTAGES**

11. **CONCLUSION**

12. **FUTURE SCOPE**

13. **APPENDIX**

Source Code

GitHub Link

1. INTRODUCTION

1.1 PROJECT OVERVIEW

The development of creative methods that make it easier for patients to take their medications at the proper time and for the appropriate length of time. The user (caretaker) can set the preferred time and medication with the help of an app. The database will keep these specifics. The web application will transmit the pharmaceutical name to the IoT Device once the medication time has come. Once the gadget has received the name of the medication, voice instructions will alert the user.

A person's life can be extended by keeping track of their health and giving them the appropriate medication. Studies show that the majority of elderly deaths have occurred while they are asleep at night. There are times when a Caretaker cannot assist someone. A personal helper for a sufferer or senior is also suggested in this article. Personal assistants can also provide in-home respite care, allowing family members or other caregivers to take a short vacation. This works major objective is to help elders take their medications on time and continue to live their lives as they see fit while also lessening the stress

It can be difficult for carers and medical staff to constantly monitor patients, therefore the project's purpose was to develop intelligent devices that would assist older people in taking their prescription at home. To avoid this problem, this system of medication reminders was developed.

1.2 PURPOSE

- This helps elderly people to take medicine on time.
- Taking medicine on time can improve their health conditions
- Caretakers can feel at ease and are reminded too.
- If the Seniors forgot to take their medicine on time then it will also send an alert to the Caretakers/Nurses.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

The existing methodologies include various gadgets available to assist patients in taking their medication either by simplifying administration or by assisting them in remembering to do so. Pill reminder charts, drug diaries, calendar clocks, telephone prompting service and multi compartment compliance aids (MCAs), talking labels, voice reminders, watch reminders, daily pill boxes, and automated pill dispensers are just a few examples some People will forget to have proper medicine correctly on time. To help these communities an application is built which sends notification to the IOT device, the device will receive the medicine name and notify the user with voice command. Additionally, alerting with an alarm and light indications. To confirm whether the person has taken the medicines or not can be identified by putting a button at the opening end of the pillbox. When the person/patient is feeling uneasy the different buttons fixed on the box he/she can press one of those fixed buttons to notify family members about the situation.[4] An IOT device for the people who take medicine frequently and also remembering the prescription of the patient's medicine for a long time is very hard to remember by the patient and also the caretaker. Present time and notification time could be saved in RTC and EEPROM. So, at the time of taking medicine, the system will be sending a notification and beep sound and display the bright light in the IOT device from which the patient has to consume medicine.

This system has an advantage of sensing whether the patient has consumed medicine or not and also senses when the patient tries to postpone the medication by opening and closing the box in to stop the notification and lighting.[5] An intelligent pillbox system is designed whether the patients have taken the correct dosage or not which has to be monitored by the caretaker. The caretaker will be notified by using the audio instructions when the medicines are taken or refilled. Different functions that are present in this device are which pill has to be taken, the remainder of medicine timings to patient/caretaker and notifying using LED, buzzer, voice alarms, and the Android applications.[6] A Pillbox with remind and consumption function that gives alert and box will be in open position at the time of taking medicines. Most patients don't recollect their whole drug routine and they additionally sometimes neglect to take their prescription [7]

Outpatients with interminable sicknesses, especially the individuals who must oversee more than one prescription or take drugs more than once per day, may not take their meds appropriately. The pace of drug adherence, characterised as "the degree to which the patient adheres to restorative guidelines", has been accounted for to be around 50–80% [8]. Quiet adherence to prescription is clinically critical in lessening mortality of genuine infection and complete medicinal services costs. By and by, the above depicted issues have opposed an answer for quite a while [10]. The most widely recognized patient-related factor coming about in non-adherence incorporates 'essentially overlooked', although prescription adherence is a multidimensional wonder [7]. The pace of 'just overlooked' was 66% in HIV/AIDS clinical preliminaries and 30% in other clinical preliminaries [8]

2.2 REFERENCES

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2. D. a. Clifton, D. Wong, L. Clifton, S. Wilson, R. Way, R. Pullinger, and L. Tarassenko. A large-scale clinical validation of an integrated monitoring system in the Emergency Department. IEEE J. Biomed. Heal. Informatics vol. 17, no. 4, pp. 835–842; 2013.
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4. Naga Swetha R, Mahendar, Roopsingh, Chinna, “Smart Pill Box Using IOT”, Vol-5, Issue4, 2018.
5. Sanjay Bhati, Harshid Soni, Vijayrajsinh Zala, Parth Vyas, “Smart Medicine Reminder Box”, Vol-3, Issue-10, April-2017.
6. Rushikesh Jadhav, Gajanan Bhople, Jyotsna Mahajan, Yogita Patil, “Intelligent Pillbox for Monitoring the Health using IOT Concepts”, Vol-06, Issue-12, Dec- 2019.
7. Eagleton J, Walker F, Barber N. An investigation into patient compliance with hospital discharge medication in a local population. Int J Pharm Pract 1993; 2: 107- 109 [Google Scholar].
8. World Health Organization Adherence to Long-Term Therapies: Evidence for Action. Geneva, Switzerland: World Health Organization; 2003. [Cited 2012 June 27]. [Google Scholar]

2.3 PROBLEM STATEMENT DEFINITION

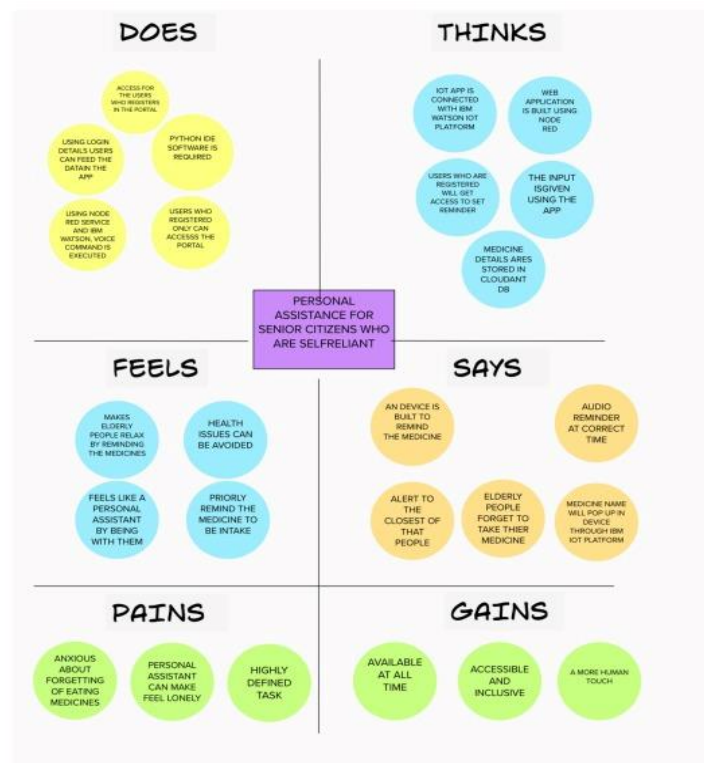
Elderly people (Senior) who want to take medicines on time, but are unable to take medicines on time because they forgot to take their medicine and they are worried about their health. Also it will give some rest to the caretakers/nurses instead of monitoring the patients around the clock. To avoid this problem, this medicine reminder system is developed. Also by means of taking the tablets at the right time it will improve the patient's lifetime.

3. IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

An empathy map is a straightforward, simple-to-understand picture that summarises information about a user's actions and views. It is a helpful tool that enables teams to comprehend their users more fully. It's important to comprehend both the actual issue and the individual who is experiencing it in order to develop a workable solution. Participants learn to think about situations from the user's perspective, including goals and problems, through the exercise of Constructing.

Empathy Map Canvas:

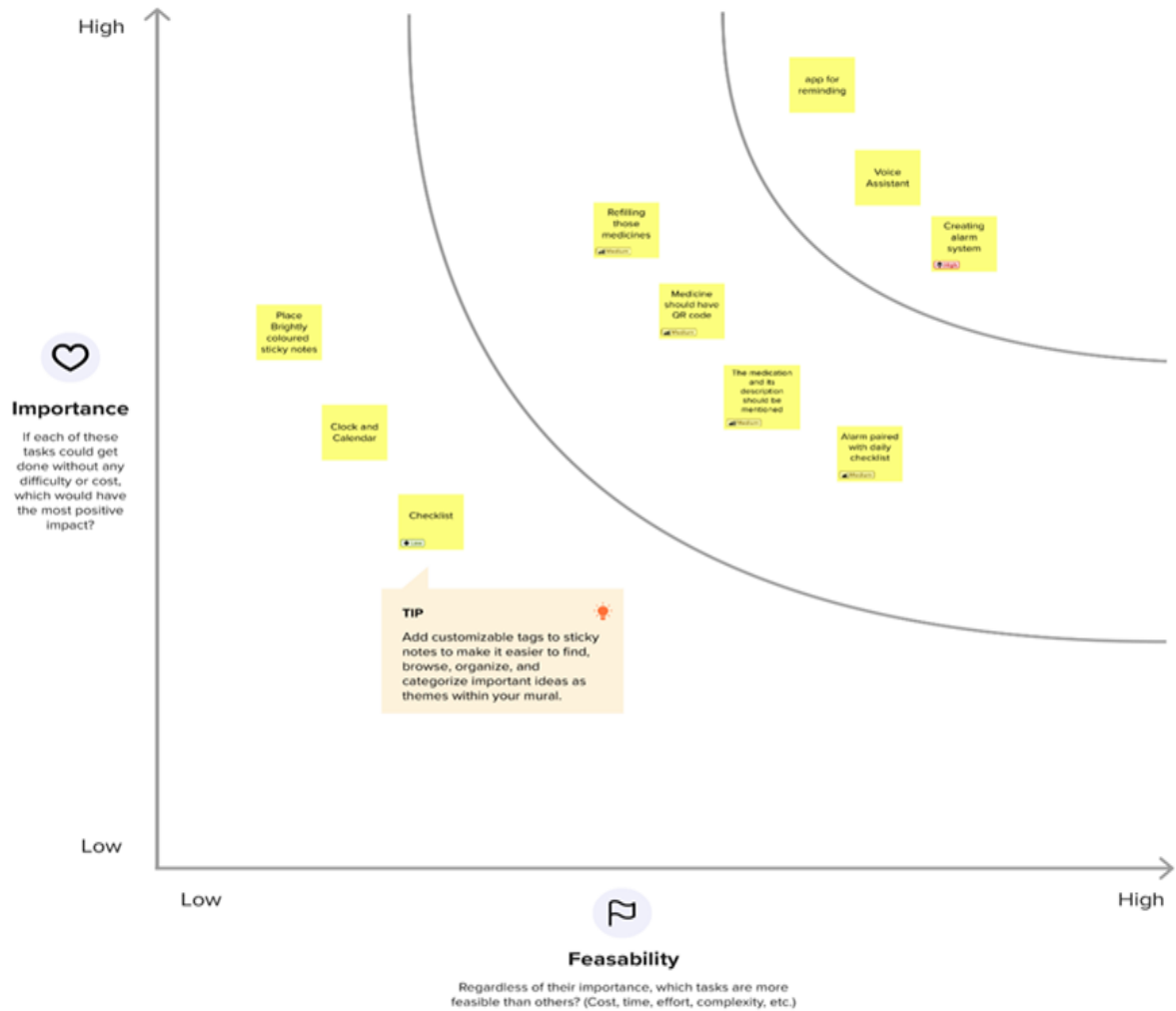


3.2 IDEATION AND BRAINSTORMING

An ideation and Brainstorming figure is a straightforward, simple-to-understand picture that summarises information about a user's actions and views. It is a helpful tool that enables teams to comprehend their users more fully. It's important to comprehend both the actual issue and the individual who is experiencing it in order to develop a workable solution. Participants learn to think about situations from the user's perspective, including goals and problems, through the exercise of constructing the map.



IDEA PRIORITATION

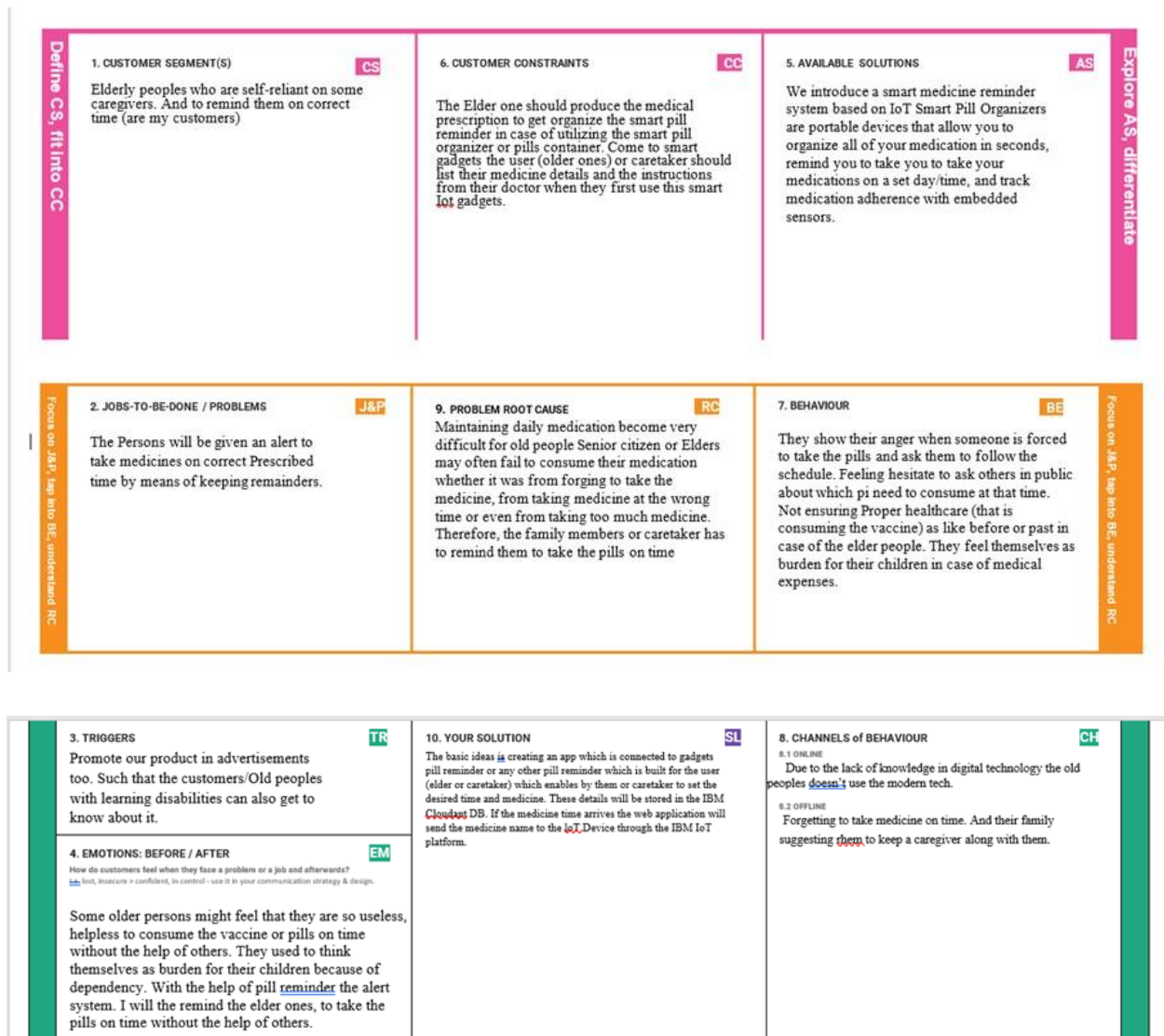


3.3 PROPOSED SOLUTION

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Old people with or without comorbidities tend to take medicine on time. So that they need self -assistance to take their medicines on time.
2.	Idea / Solution description	We'll be creating an application integrated with watch which alerts the old people by means of Pill reminder through a spam call or call from the concerned hospital management.
3.	Novelty / Uniqueness	Deaf people can easily remind the tablet time with the vibration in the smart watch
4.	Social Impact / Customer Satisfaction	We constructed this based on the research findings from the user interview. The correct time of intaking medicines will make a patients feel healthy and helps them to recover from disease or disorder quickly

5.	Business Model (Revenue Model)	By our web application the profit or revenue can be made from some pop-up advertisements and relatable medical care advertisements.
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3.4 PROBLEM SOLUTION FIT



4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

The most basic fundamental requirements which I have used in this Project is mentioned below:

FN NO.	Functional Requirement (Epic)	Sub Requirement (Story / SubTask)
1	User Registration	Users can Register their details through the Medicine Reminder Website.
2	User login	In the Login Process, User gives the valid Gmail Account or Phone number for the authentication Process.

3	Admin Login	In the Administrator login Process, the Administrator should enter the valid ID and Password.
4	User Medical Report	Users should produce the Medical Report (Medicine Report) for setting the alarm to consume the medicine through the Medicine reminder app or website.
5	User Scheduling	<p>Users schedule their medicine or pills according to their prescribed time.</p> <p>This scheduling may include details about the medicine, dosage, etc..</p>
6	Alternating the schedule According to the User	The user can alter the medicine and timing details (i.e adding or deleting medicine) according to new prescription given by the doctor.

7	A Reminder through the TTS Service	The Pills Reminder app notifies or reminds the user when to take Specific medicine through the Text-to-Speech (TTS) Service
8	Alert message	The admin or hospital management sends the alert message to the user and their guardian (family member) when the user did not consume pills on concern time.
9	Report Maintaining	It generates a report of the user every week and those reports are sent to their guardian or hospital. The monthly reports are maintained for the future purpose....

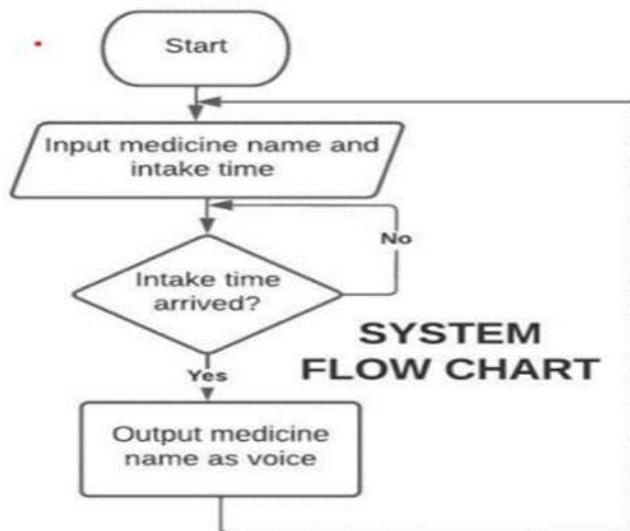
4.2 NON-FUNCTIONAL REQUIREMENT

The most basic Non - functional requirements which I have used in this Project is mentioned below:

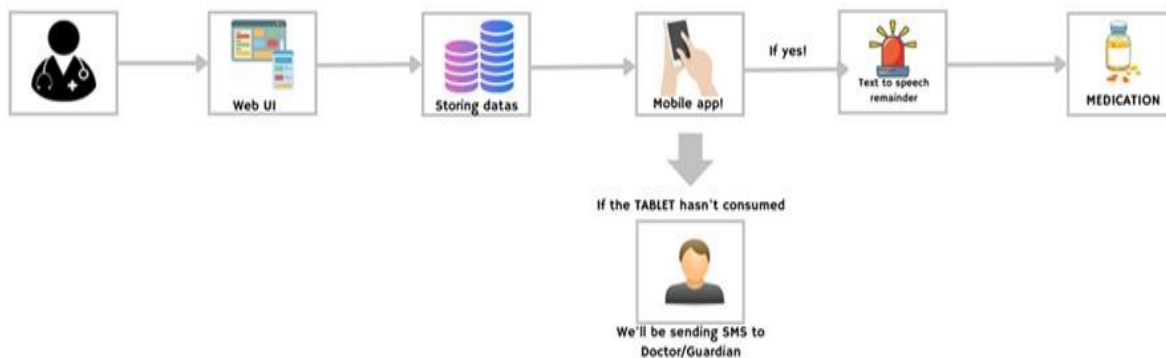
NFR NO	NON-FUNCTIONAL REQUIREMENT	DESCRIPTION
1	Usability	<ol style="list-style-type: none"> 1. This application is used to support multiple users. 2. The Reminder is easy to set up and use.
2	Security	<p>User's Medical Reports are highly secure.</p> <p>Each part in the reminder system is secured.</p>
3	Reliability	<p>Ensuring that elder one is properly taking their medications and that help to avoid unnecessary risk or serious illness through a reminder app.</p>
4	Performance	<p>The Reminder provides acknowledgment in just one second once the Users information is checked.</p>

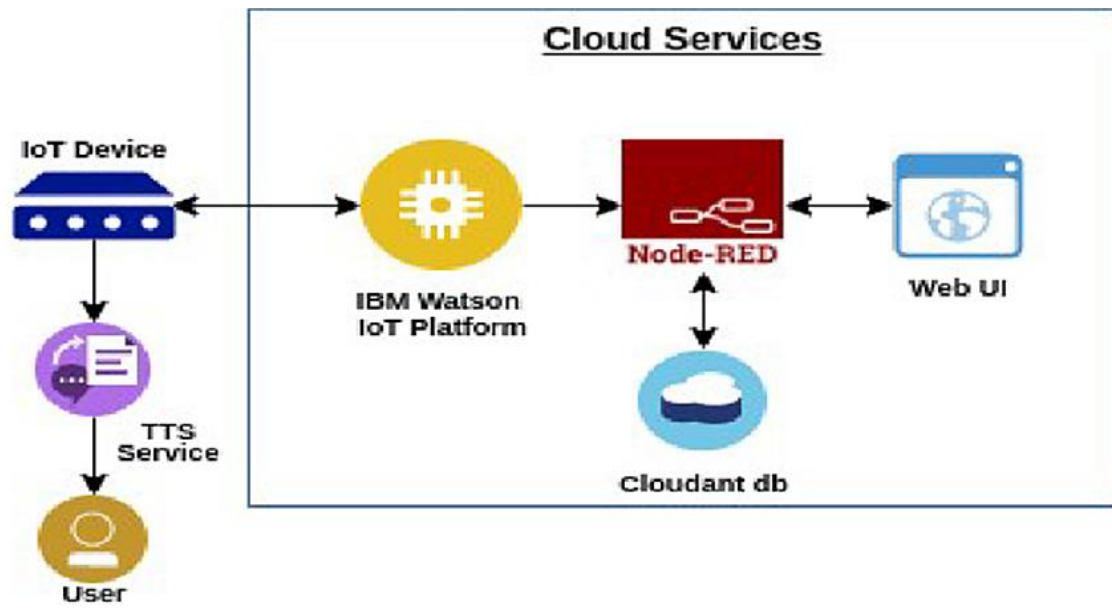
5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAM



5.2 SOLUTION AND TECHNICAL ARCHITECTURE





5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Citizen)	Scheduling	USN-1	As a user, I want to take Medicines on time and monitor my health.	I want to take medicines on time	High	Sprint-1
Customer (Patient)	Smart medicine box	USN-2	As a user, I want to take my tablets on time by voice command.	I want to take my tablets on time by voice command	High	Sprint-1
Customer (Doctor)	Smart medicine box	USN-3	As a user, my patient needs to take medicines on time and monitoring the activity.	My patient needs to take medicines on time	Low	Sprint-2
Customer (CareTaker)	Data storage	USN-4	As a user, my patient needs medication time and prescription should load in the database for the upcoming week.	My patient medication time and prescription should be in database list	Medium	Sprint-3
Customer (CareTaker)	Smart medicine box	USN-5	As a user, I need to take my medicine in nearby places with light notification.	I want to access the customer health 24/7	High	Sprint-4
Customer (Patient)	User Experience	USN-6	As a user, the app should be easy and simple to use	I want an easy to handle application	Medium	Sprint-4

6. PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration via MEDVANZA App	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	3	High	Sathish. S Sasikumar. R S. Mohit
Sprint-1	Registration via Facebook/Gmail	USN-2	As a user, I can register for the application through Facebook	3	High	Sathish. S Santhosh Kumar. R S. Mohit
Sprint-1	Reminder System in the application	USN-3	As a user, <u>Once</u> after the registration, I can log in and set the reminder for Pills	3	High	Sathish. S Sasikumar. R S. Mohit
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	1	Low	Sathish. S Sasikumar. R S. Mohit
Sprint-2	Create Web UI for administrative purpose	USN-5	To create Web UI for Admin Page to store Prescriptions along hospital side.	3	High	Sathish. S
Sprint-2	Registration via Facebook/Gmail	USN-6	As a user, I can Register through the <u>facebook</u> .	3	High	Sathish. S
Sprint-2	Registration via Gmail	USN-7	As a user, I can Register through the Gmail.	3	High	Sathish. S Sasikumar. R S. Mohit
Sprint-3	Create IBM Watson and device settings	USN-8	To create the IBM Watson IOT platform and <u>Integrate</u> the microcontroller with it to send sensed data to cloud	3	High	Sathish. S Sasikumar. R S. Mohit
Sprint-3	Create node red service	USN-9	Store the data of the Prescription in the Web UI	3	High	Sathish. S Sasikumar. R S. Mohit
Sprint-3	Text to speech	USN - 10	Integrating Text to Speech in the application or web application in the user end.	3	High	
Sprint-4	A remainder to the TTS services	USN-11	The admin or hospital management send the alert message to the user and their guardian (family member) when the user did not consume pills on concern time.	3	High	Sathish. S Sasikumar. R S. Mohit
Sprint-4	Alert Message	USN-12	The admin or hospital management send the alert message to the user and their guardian (family member) when the user did not consume pills on concern time.	3	High	Sathish. S Sasikumar. R S. Mohit
Sprint-4	Testing	USN-13	Testing of project and final deliverables	3	High	Sathish. S Sasikumar. R S. Mohit

6.2 SPRINT DELIVERY SCHEDULE

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	23 Oct 2022	29 Oct 2022	20	28 Oct 2022
Sprint-2	20	4 Days	30 Oct 2022	05 Nov 2022	20	02 Nov2022
Sprint-3	20	6 Days	07 Nov 2022	13 Nov 2022	20	08 Nov 2022
Sprint-4	20	4 Days	14 Nov 2022	20 Nov 2022	20	12 Nov 2022

Velocity:

Sprint duration = 6 days Velocity of the team = 20

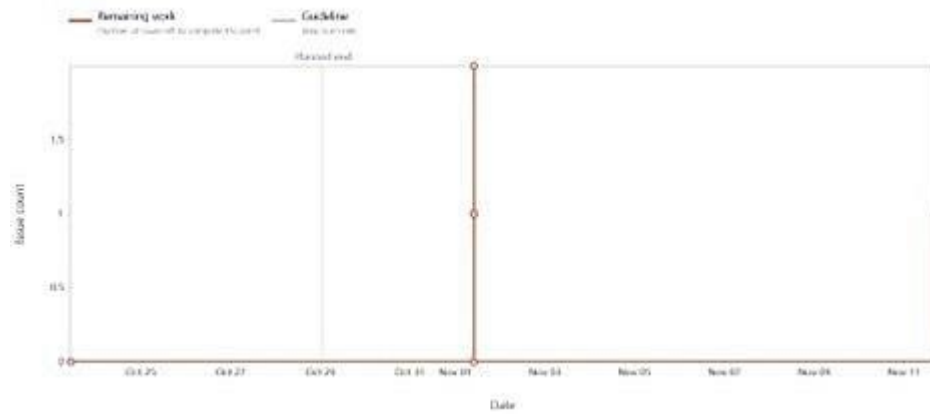
Points average velocity (AV) = $\frac{\text{Velocity}}{\text{Sprint duration}}$

$$AV = 20/6 = 3.34$$

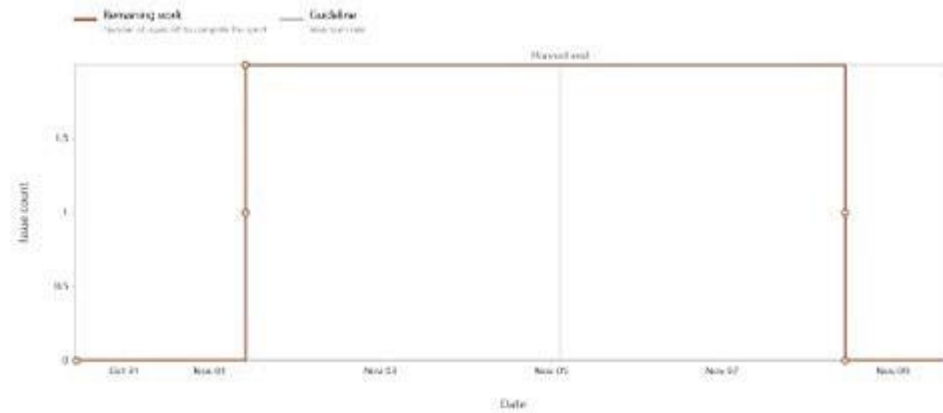
Average Velocity = 3.34

6.3 REPORT FROM JIRA

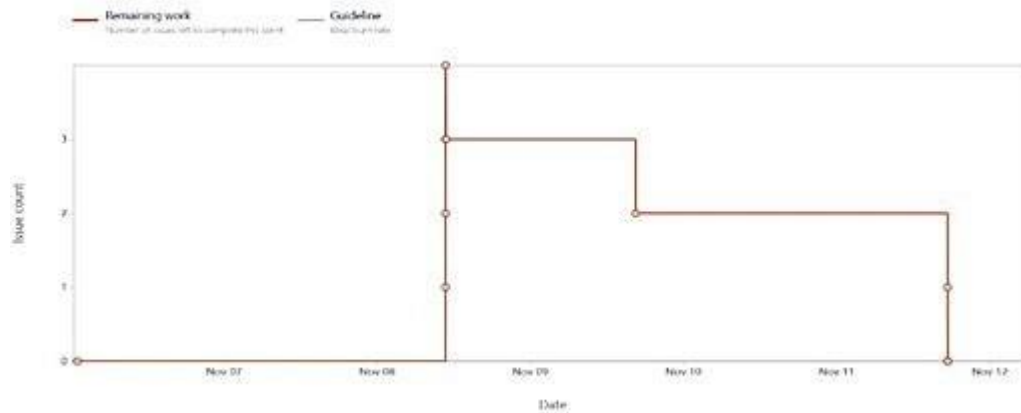
Sprint 1:



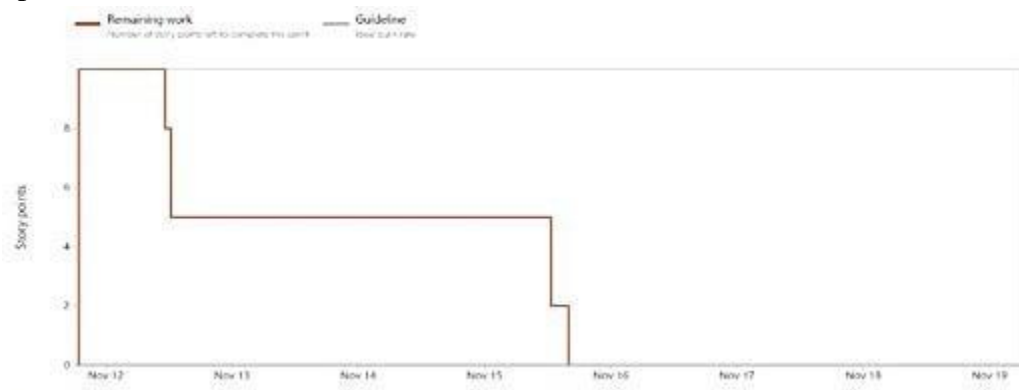
Sprint 2:



Sprint 3:



Sprint 4:



7. CODING & SOLUTIONING

7.1 WEB UI TO ENTER MEDICINE NAME AND TIME FOR INTAKE

System Info

Insert a new user

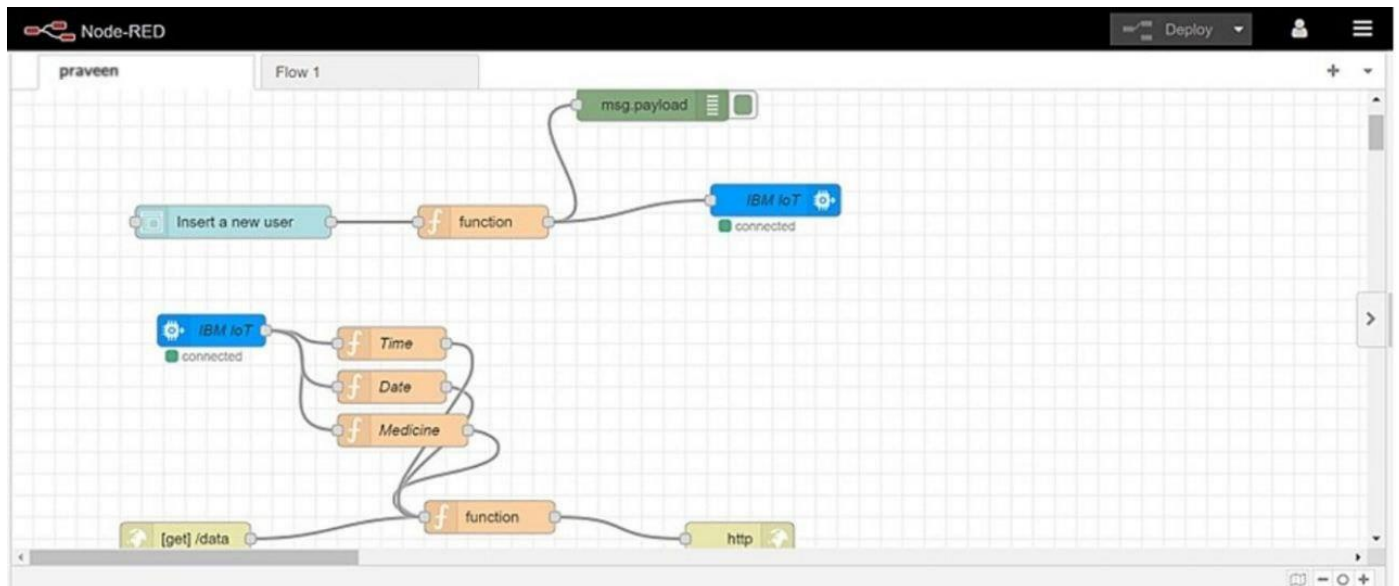
medicine Name *
Dibizide

Date *
15/11/2022

Time *
04.00 PM

SUBMIT **CANCEL**

7.2 NODE - RED FEATURE FOR SENDING DATA TO IBM PLATFORM



7.3 CLOUDANT DATABASE TO STORE MEDICINE NAME AND INTAKE TIME

The screenshot shows the Cloudant database interface for a database named 'medicine'. The interface includes a sidebar with navigation options: All Documents, Query, Permissions, Changes, and Design Documents. The main area displays a table of documents. The table has two columns: '_id' and 'name'. The data is as follows:

_id	name
2022-11-11 20:16	Dolo-650
2022-11-11 20:18	Cetirizine
2022-11-11 20:20	Azithromycin
2022-11-12 21:00	PAN-20
2022-11-12 8:30	Amoxicillin

7.4 MOBILE APPLICATION (MEDVANZA)

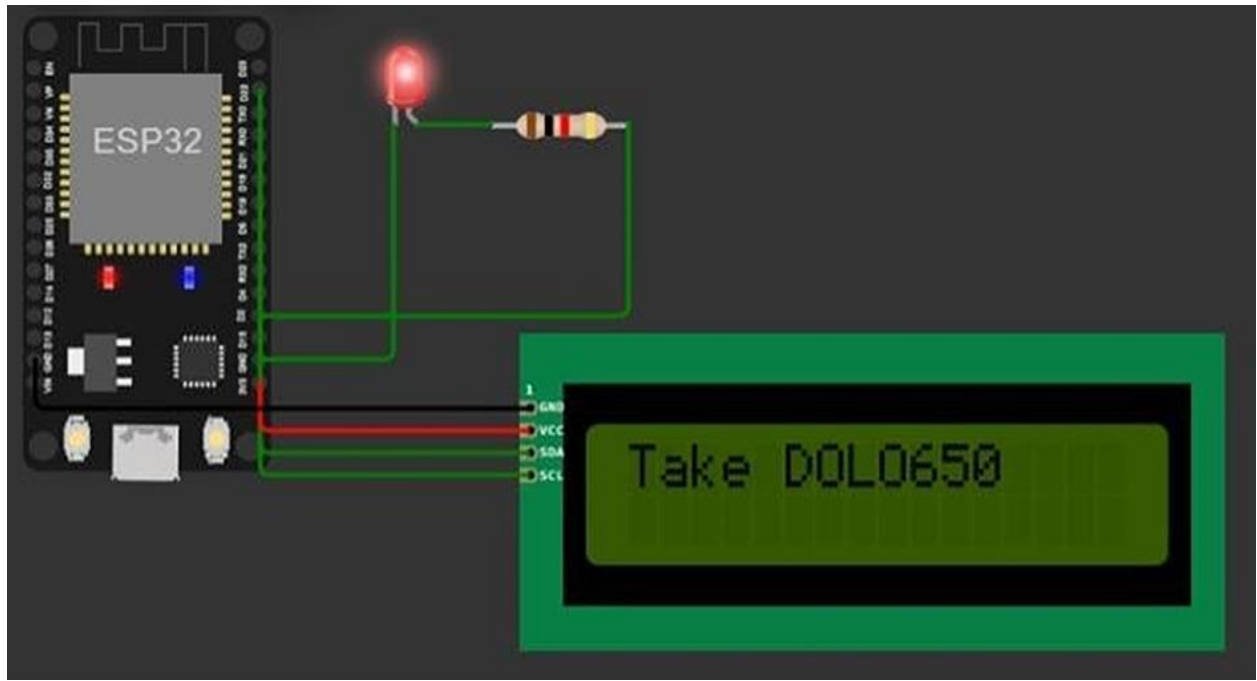


Medicine Name

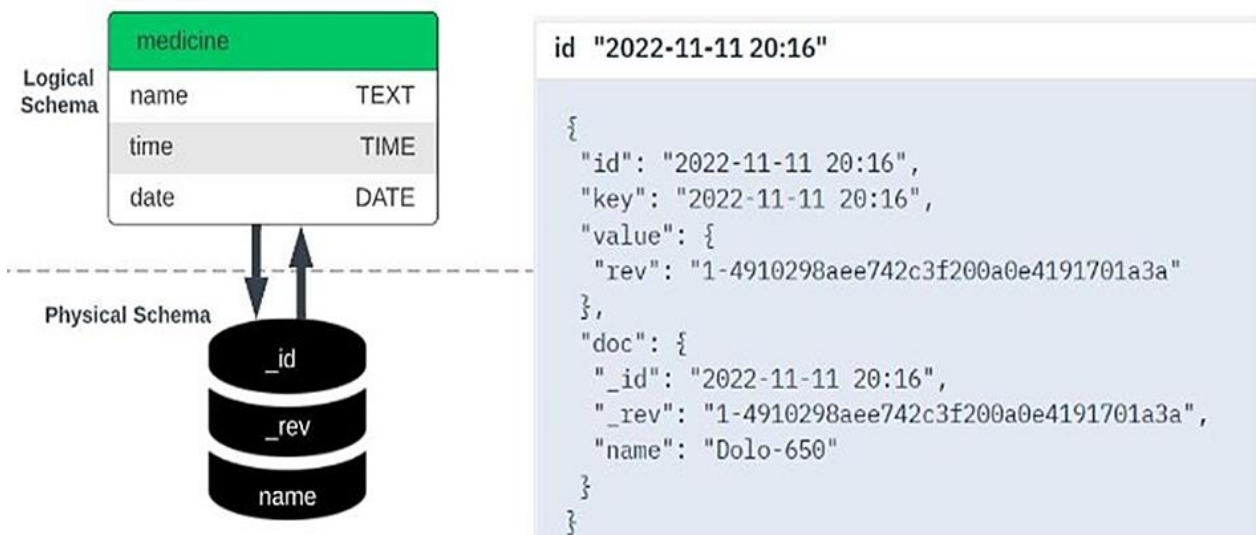
Date

Time

7.5 DISPLAY THE NAME OF THE MEDICINE IN AN IOT DEVICE AT THE SCHEDULED TIME

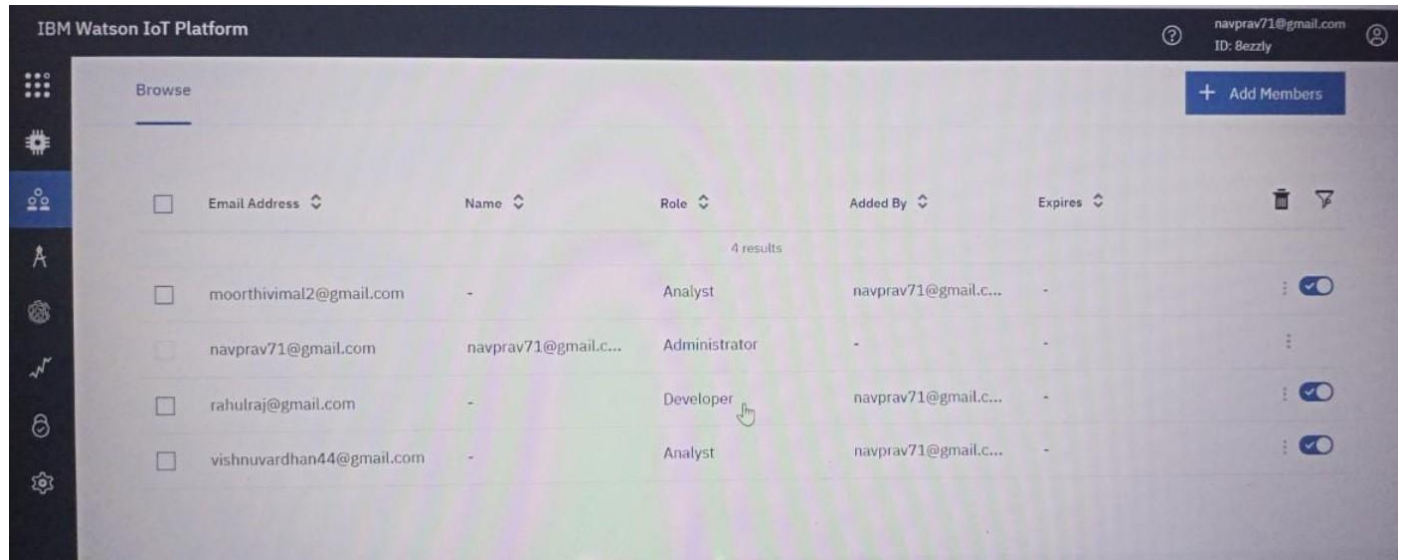


7.6 DATABASE SCHEMA



7.7 IBM WATSON

Node - Red sends the direct details from the web user and it Sends it in the JSON format to WATSON IOT PLATFORM.



8. TESTING

8.1 USER ACCEPTANCE TESTING (UAT)

Purpose: The purpose of this document is to briefly explain the test coverage and open issues of Personal assistance for seniors who are Self-Reliant project at the time of the release to User Acceptance Testing (UAT).

8.2 TEST CASE ANALYSIS

This report shows the number of test cases that have passed, failed, and untested.

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	5	0	0	5
Client Application	42	0	0	43
Security	1	0	0	1
Outsource Shipping	0	0	0	0
Exception Reporting	2	0	0	2
Final Report Output	6	0	0	6
Version Control	1	0	0	1

9. RESULTS:

9.1 PERFORMANCE METRICS

NFT - Risk									
S.No	Project Name	Scope	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Volume Changes	Risk Score	Justification
1	Personal Assistance For Seniors who are Self-Reliant	Existing	Low	Moderate	Moderate	Causes delay in runtime	>10 to 30%	ORANGE	As we have seen the changes, it adds the setup time
NFT - Detailed									
S.No	Project Overview	NFT Test approach	Assumptions/Dependencies/Risks	Approvals/SignOff					
1	Personal Assistance For Seniors who are Self-	LOAD	Dependencies	SignOff					
End Of Test									
S.No	Project Overview	NFT Test approach	NFR - Met	Test Outcome	GO/NO-GO decision	Recommendations	Identified Defects (Detected/Closed/Open)	Approvals/SignOff	
1	Providing Assistance to Seniors by developing a Software application to remind their medicine intake time	LOAD	MET	Able to Support in Other Platforms	GO	To have browsers to have enhanced capabilities	Closed	Approval	

10. ADVANTAGES & DISADVANTAGES:

Advantages:

- Helpful for people who have no caretakers.
- Helps people to take medicines on time by voice command.

Disadvantages:

- Elderly people should be aware of how to use the application.
- There is no way to determine what actually happened as it only gives the remainder to take the medicineInternet connection is required.

11. CONCLUSION:

Our project's goal is to see how successful an automated pill dispenser will be in assisting individuals in better self-managing their medications. This might be demonstrated by the following:

- Better quality of life for individuals with chronic disabilities and their caregivers.
- Improved ability to stay self-sufficient at home
- Social impact on the pharma sector .
- Less dependency on health-care and social-services.

The device is intended for those with memory impairments, and several of the medical diagnoses recorded for trial participants, including Alzheimer's and dementia, the elderly and persons with long-term medical conditions who must take many prescriptions every day, backed up this claim.

In conclusion, we used technology to have a social effect in the pharmaceutical industry.

12.FUTURE SCOPE

1. We will further extend the app where the prescriptions of the patients will be directly uploaded to the database.
2. When your medicine runs low, we will reach out to third parties so you can get it delivered at your door.
3. Touch sensors can be incorporated on each compartment to track the number of times the compartment has been opened so that refill time can be calculated.

`13.APPENDIX:

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQTT
#include <LiquidCrystal_I2C.h>
#define LED 2 void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength); //-----credentials of IBM Accounts-----

#define ORG "ok5c7o"//IBM ORGANITION ID
#define DEVICE_TYPE "ESP"//Device type mentioned in ibm watson IOT
Platform
#define DEVICE_ID "ESP32"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "LC!x?+V9etumdVMaSR" //Token
String data3="";

//----- Customise the above values ----- char server[] = ORG
".messaging.internetofthings.ibmcloud.com";// Server Name char publishTopic[]
= "iot-2/evt/Data/fmt/json";// topic name and type of event perform and format in
which data to be send
char subscribetopic[] = "iot-2/cmd/command/fmt/String";// cmd REPRESENT command
type AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth";// authentication method char
token[] = TOKEN; char clientId[] = "d:" ORG ":" DEVICE_TYPE ":"
DEVICE_ID;//client id
```

```

LiquidCrystal_I2C lcd(0x27,16,2);

//

WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, callback ,wifiClient); //calling the predefined
client id by passing parameter like server id,portand wificredential void
setup();// configureing the ESP32
{
  Serial.begin(115200);
  pinMode(LED,OUTPUT);
  Serial.println();
  mqttconnect();
  wificonnect();
  Void loop(); {
  if(!clientloopconnected()){
  Serial.println("Reconnecting client to")

  /*.....retrieving to
  Cloud..... */

```

```

void mqttconnect() { if
    (!client.connected()) {
        Serial.print("Reconnecting client to ");

        Serial.println(server); while (!!!client.connect(clientId,
            authMethod, token)) {
                Serial.print("."); delay(500);
            }

            initManagedDevice();
            Serial.println();
        } } void wificonnect() //function defination for
wificonnect
{
    Serial.println();
    Serial.print("Connecting
to ");

    WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish the connection
    while (WiFi.status() != WL_CONNECTED)
        { delay(500);
        Serial.print("."); }

    Serial.println("");
    Serial.println("WiFi
connected");

```

```

Serial.println("IP address:
");
Serial.println(WiFi.localI
P());
}

```

```

void initManagedDevice() { if
    (client.subscribe(subscribetopic)) {
        Serial.println((subscribetopic));
        Serial.println("subscribe to cmd OK");
    } else {
        Serial.println("subscribe to cmd FAILED");
    }
}

```

```

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength) {

```

```

    Serial.print("callback invoked for topic: ");
    Serial.println(subscribetopic); for (int i
    = 0; i < payloadLength; i++) {
        //Serial.print((char)payl
        oad[i]); data3 +=
        (char)payload[i];
    }

```



```
Serial.println("Please take "+ data3); if(data3
!= "")
{
    lcd.init();
    lcd.print("Take"+
data3);
    digitalWrite(LED
,HIGH); delay(20000);

    digitalWrite(LED,LOW);
} else
{ digitalWrite(LED,LOW);

}
data3="";
}
```

GitHub Project Link - <https://github.com/IBM-EPBL/IBM-Project-46071-1660736046>