

PERSONAL ASSISTANCE FOR SENIORS WHO ARE SELF-RELIANT

PROJECT REPORT

Project Name	Personal Assistance For Seniors Who Are Self-reliant
Team ID	PNT2022TMID00130
Team Members	<ul style="list-style-type: none">• Nandhini V (Team Leader)• Nivedha R• Ranjeni G• Siva Dharshini K

1. INTRODUCTION

1.1. Project Overview:

Elderly people (Seniors) often forget to take medicines on time. Even though they remember to take medicine, sometimes they may forget which medicine to take. To avoid these problems, we developed a web application integrated with IOT device which will provide a scheduled voice output and display medicine name on a microcontroller during intake time.

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.

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, multi compartment compliance aids (MCAs), talking labels, voice reminders, watch reminders, daily pill boxes, and automated pill dispensers are just a few examples.

2.2. References:

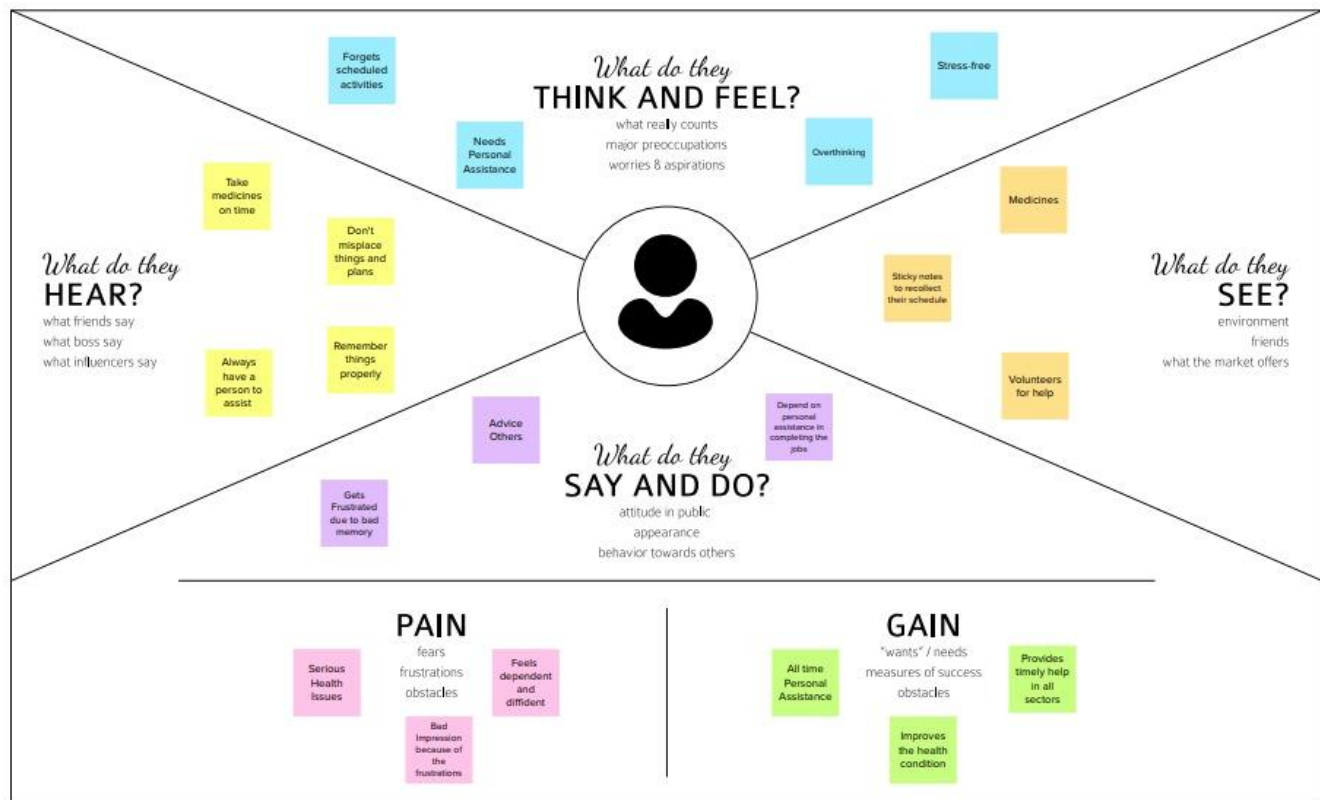
- Personal assistant application for senior citizen
Nitinkumar chaudary, abhishek vishwakarma, arya bhavate- june 2022.
- Adapting a virtual assistant device to support the interaction with elderly people
Manuel bolanos, cesar collazos and francisco gutierrez - 2020
- Personal assistance device for independent senior citizens/patients
A. Yuvaraj , b.n. gunasekhar reddy, c.v. saritha – january 2020
- An empirical study of older adult's voice assistant use or health information seeking
Robin brewer, casey pierce, pooja upadhyay and leeseul park – january 2021.
- With a little help from my conversation agent: towards a voice assistant for improved patient compliance and medication therapy safety
Jah schulte to brinke , chrisitan fitte, eduard anton, pascal meier and frank teuteberg - 2021
- Habitat: an iot solution for independent elderly people
Elena borelli, giacomo paolini, francesco antoniazzi, marina barbiroli and francesca benassi.

2.3. Problem Statement Definition:

Elderly people (Senior) who wants to take medicines on time, but unable to take medicines on time due to their forgetfulness, are worried about their health.

3. IDEATION AND PROPOSED SOLUTION

3.1. Empathy Map Canvas:

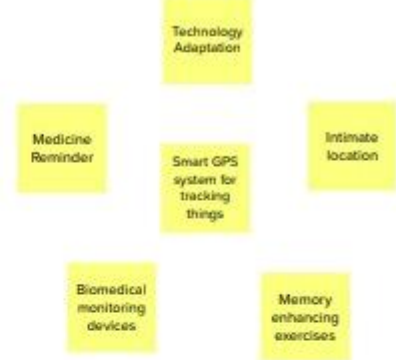


3.2.Ideation and Brainstorming:

NANDHINI



RANJENI



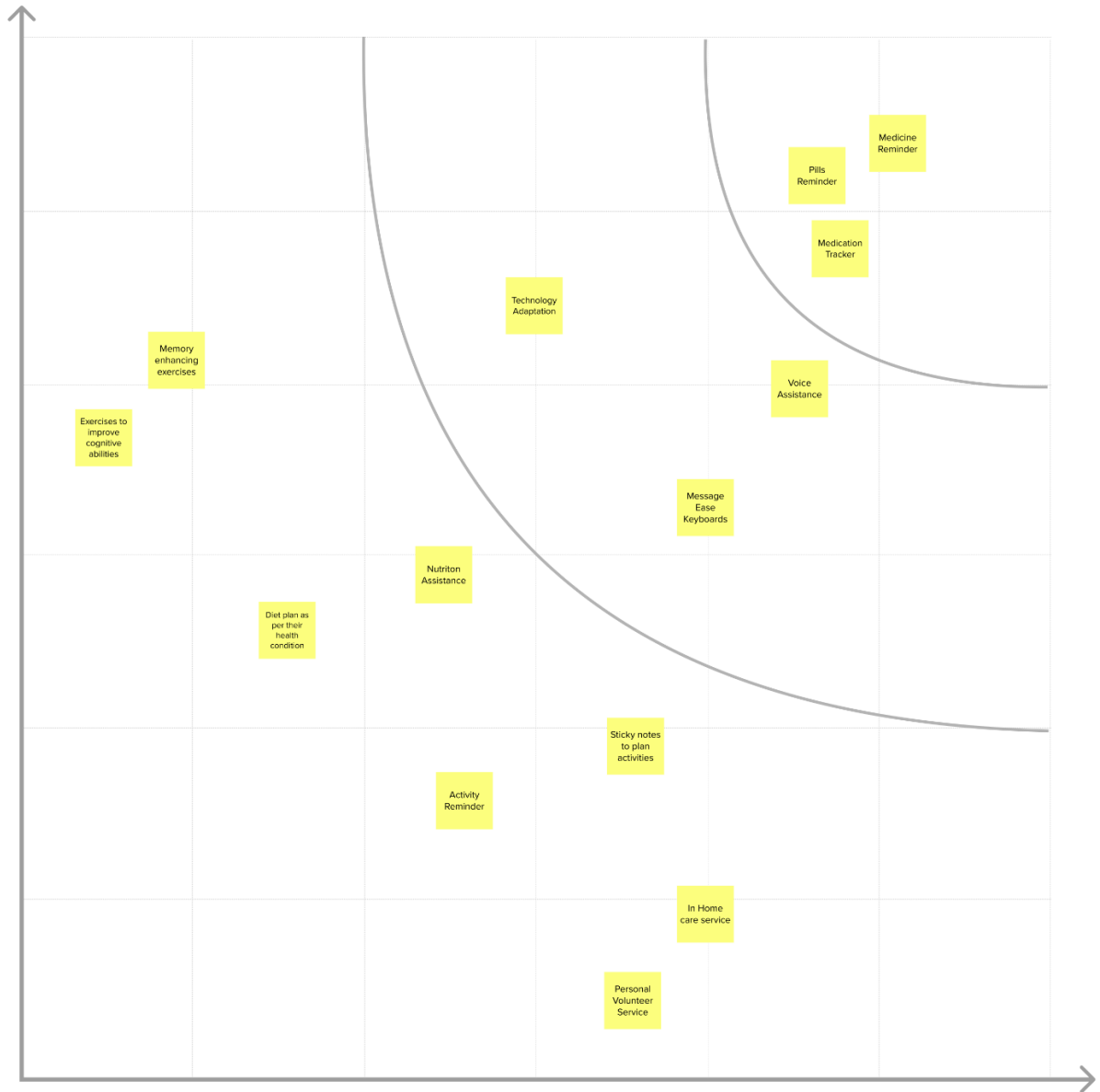
NIVEDHA



SIVA DHARSHINI







3.3 Proposed Solution:

A website is built for the user which enables him to set the desired time and medicine. These details will be stored in the IBM Cloudant DB. If the medicine time arrives the web application will send the medicine name to the IoT Device through the IBM IoT platform. The device will receive the medicine name and notify the user with voice commands.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	<p>Personal Assistance for seniors who are self-reliant.</p> <p>To find a solution for the challenges faced by elderly people.</p>
2.	Idea / Solution description	<p>Medicine Reminders can remind seniors to take medicines when the time comes. Since many elders forget to take medicines—or wind up taking double or triple doses—having a facility to remind them and monitor medications can prove invaluable</p>
3.	Novelty / Uniqueness	<p>Sometimes elderly people forget to take their medicine at the correct time.</p> <p>They also forget which medicine He / She should take at that particular time.</p> <p>And it is difficult for doctors/caretakers to</p>

		<p>monitor the patients around the clock.</p> <p>So, Medicine Reminders proves to be the best fit.</p>
4.	Social Impact / Customer Satisfaction	Medicine Reminders provides timely help and improves the health condition of seniors and serves as an all time personal assistance.
5.	Business Model (Revenue Model)	Since the population of seniors who require help and are dependent on others are higher, the usage of the application is also higher.
6.	Scalability of the Solution	The idea can be implemented easily and efficiently and dependency of seniors decreases.

3.4. Problem Solution Fit:

<p>1. CUSTOMER SEGMENT(S) The chief customers of our project are the elderly people who require personal assistance especially medical assistance</p> <p>CS</p>	<p>6. CUSTOMER CONSTRAINTS The constraints that prevent our customers from taking action are network connection, availability of devices and lack of knowledge in using them.</p> <p>CC</p>	<p>5. AVAILABLE SOLUTIONS The existing solutions include the need of a personal assistance or a volunteer and even the conventional methods to remind daily routines. But all of them are not to the mark and do not serve the ultimate purpose.</p> <p>AS</p>
<p>2. JOBS-TO-BE-DONE / PROBLEMS When customers forget to take medicines regularly, their health keeps on deteriorating. Sometimes they wind up taking double or triple doses. The feeling of being dependent creates frustration and a sense of irritation among the aged people.</p> <p>J&P</p>	<p>9. PROBLEM ROOT CAUSE Aging factor and diseases like Alzheimers can be the root cause for the challenges faced by the seniors considering the memory aspect.</p> <p>RC</p>	<p>7. BEHAVIOUR Our project idea – “Medicine Reminder” proves to be indispensable and the best fit for the problem, by monitoring the medications properly and at the same time replaces the need for the physical existence of a person or a volunteer to remind them.</p> <p>BE</p>
<p>3. TRIGGERS Senior citizens often like to be independent. So when our target customers try out our product and start being independent, this triggers other people of their age to use our product.</p> <p>TR</p> <p>4. EMOTIONS: BEFORE / AFTER Emotions Before: Feels dependent, diffident, insecure and always have a sense of frustration and incapability. Emotions After: Feels happy, confident, periodic and health condition is also improved.</p> <p>EM</p>	<p>10. YOUR SOLUTION Sometimes elderly people forget to take their medicine at the correct time. They also forget which medicine He / She should take at that particular time. And it is difficult for doctors/caretakers to monitor the patients around the clock. Thus Medicine Reminders acts as a facility to remind them and monitor medications and thus proves to be invaluable.</p> <p>SL</p>	<p>8. CHANNELS of BEHAVIOUR 8.1 ONLINE The system stores all the information regarding the medications and creates a mechanism for the alert system. 8.2 OFFLINE Once the Customer is intimated by the alarm, (a voice based output) they have to follow the instruction and take the necessary actions</p> <p>CH</p>

4. REQUIREMENT ANALYSIS

4.1. Functional Requirements:

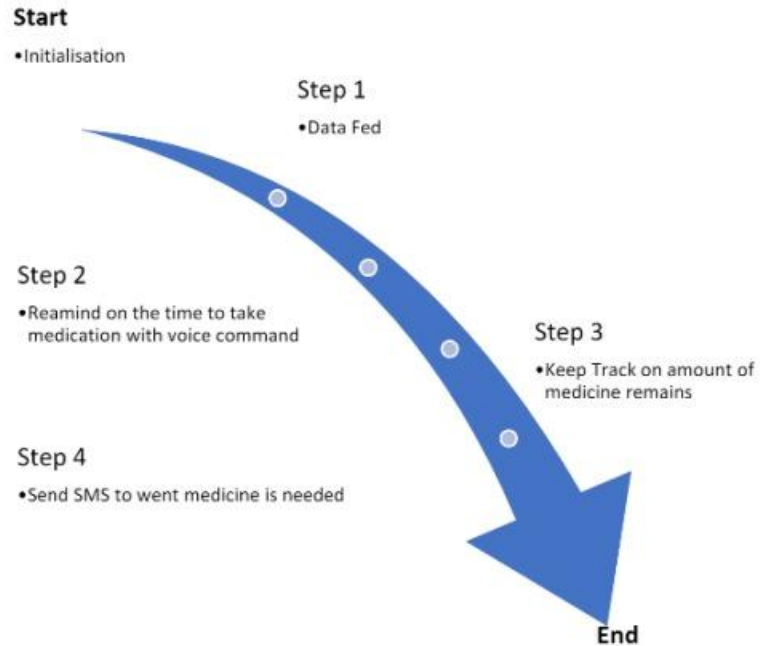
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	login through User Id and Password.
FR-4	Network Connectivity	via wifi /mobile data.
FR-5	IBM IoT Platform	Access cloud storage via internet and it gives medication information.
FR-6	Node-RED	Uses to transfer the data from IOT platform to UI platform and helps in storing the data.

4.2 Non-Functional Requirements:

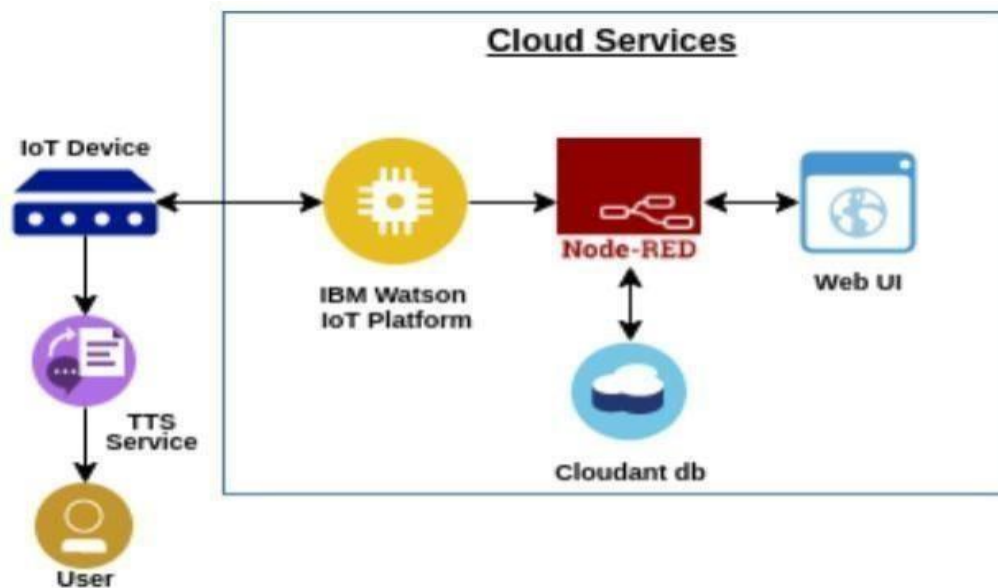
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	It can easily track and monitor the medication time of users and share the information to the caregivers.
NFR-2	Security	The cloudant database is highly secured and it prevents data from hacking.
NFR-3	Reliability	The prescription of medication for users is assured all the time.
NFR-4	Performance	It reminds users to take their medications and get them refilled, warns about drug interactions, and assists caregivers in managing prescriptions.
NFR-5	Availability	To keep track the medication of users.
NFR-6	Scalability	The users can set the time for their medication and also can adjust how much medication to take within the application.

5. PROJECT DESIGN

5.1. Data Flow diagrams:



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 Schedule:

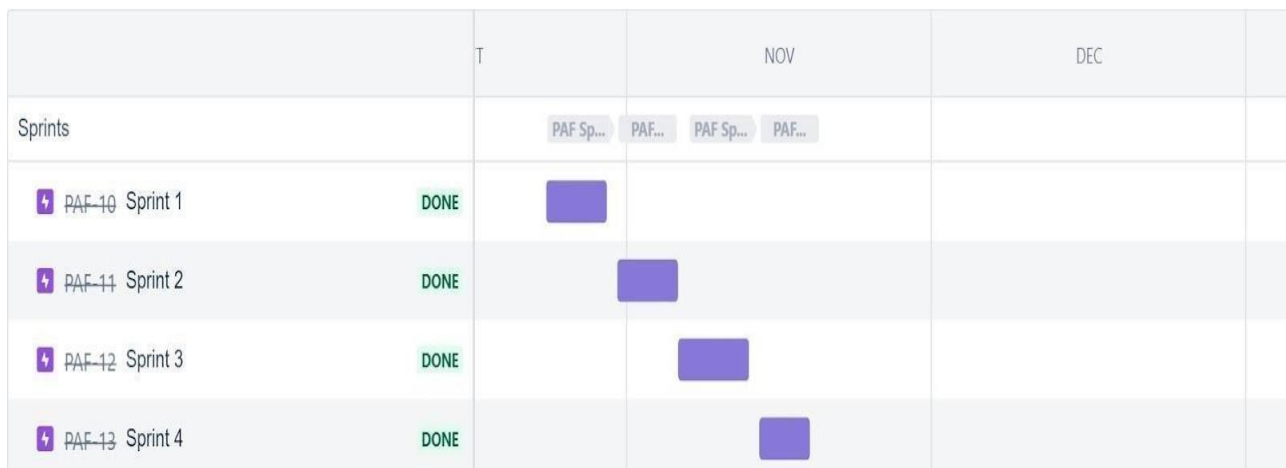
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story points	Priority	Team Members
Sprint 1	Set Alarm	USN-1	As a user, I can set an alarm to alerting a medicine through medicine remainder system	10	High	Nandhini V
Sprint 1		USN-2	As a user, I can Activate and Deactivate the alarm	10	High	Ranjeni G
Sprint 2	Notification	USN-3	As a user once I can the set the alarm then I gets the notification	10	High	Nivedha R
Sprint 2		USN-4	As a user, If I requires this system then a notification will be sent into his device.	10	High	Siva dharshini K

Sprint 3	Medication Detail	USN-5	As a user, I have multiple medications each day, I can put each pill in the box for the corresponding day.	10	High	Nivedha R Siva dharshini K
Sprint 3		USN-6	As a user,between setting an alarm and using a pillbox, I'll be able to stay on top of your medications and not miss a dose.	5	Low	Nandhini V Ranjeni G
Sprint 3		USN-7	As a user, I can store the name of the medicine with its description.	10	High	Nandhini V Nivedha R Ranjeni G Siva dharshini K
Sprint 4	GPS Tracking	USN-8	As a user they can also help large hospitals and clinics manage their inventory more effectively.	5	Low	Nandhini V Nivedha R Ranjeni G Siva dharshini K
Sprint 4	Sensor	USN-9	As a user,they have used for keeping the record in medicine details for reminding the schedule of the medicine.We have used the IOT enabled Arduino device for monitoring the System.	10	High	Nandhini V Nivedha R Ranjeni G Siva dharshini K

6.2. Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint 1	20	8 days	29-10-2022	5-11-2022	20	4-11-2022
Sprint 2	10	8 days	7-11-2022	14-11-2022	10	13-11-2022
Sprint 3	20	8 days	16-11-2022	23-11-2022	20	23-11-2022
Sprint 4	10	8 days	23-11-2022	30-11-2022	10	30-11-2022

6.3. Report From Jira:



7. CODING & SOLUTIONING

7.1. Web UI to enter medicine name and time for intake:

Medicine Reminder

Medicine Name *

DOL0650

Time *

23:00



Date *

13-11-2022



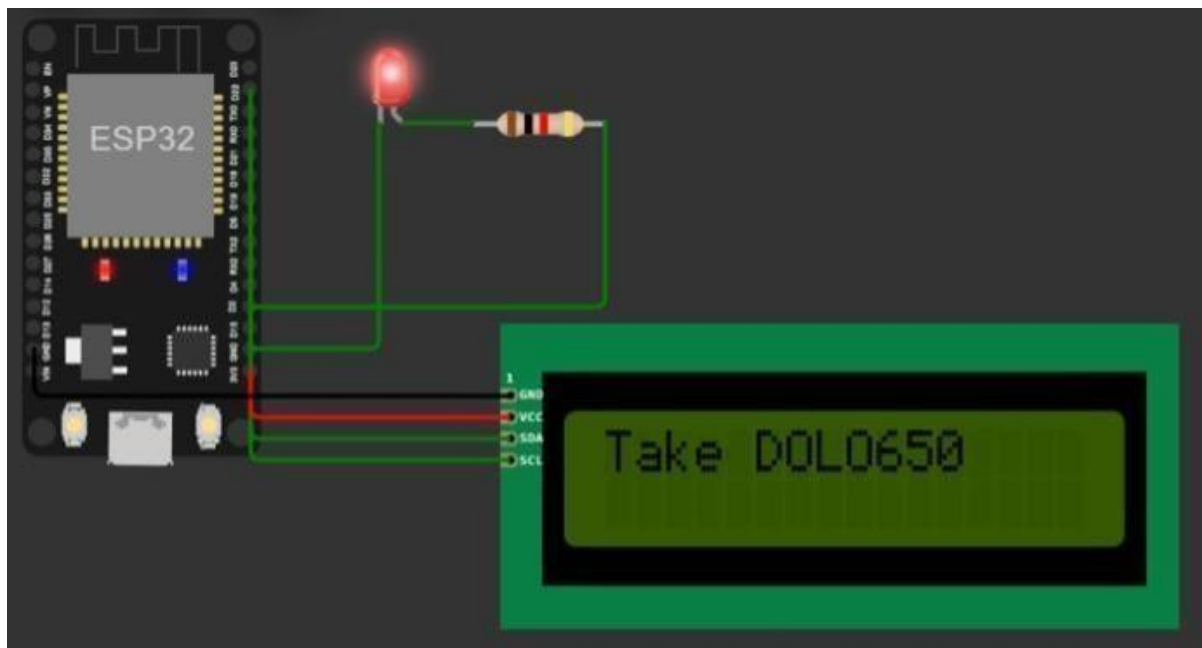
SUBMIT

CANCEL

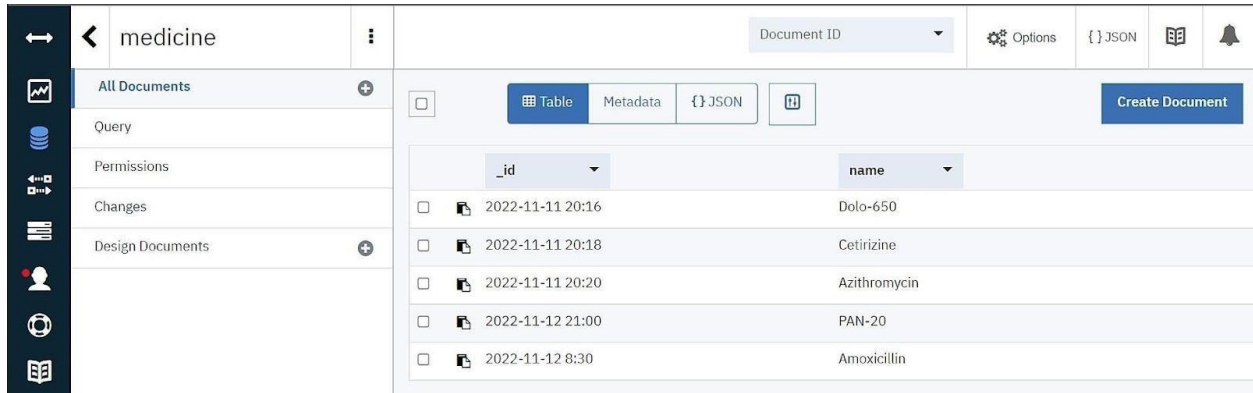
7.2. Sending voice output at the scheduled time:



7.3. Display the name of the medicine in an IoT device at the scheduled time:



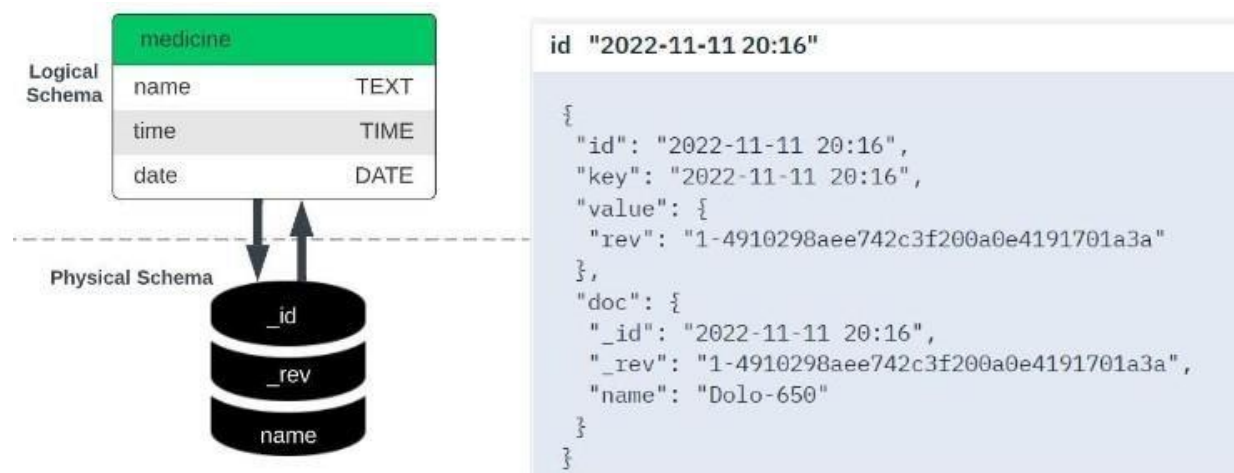
7.4. Cloudant Database to store medicine name and intake time:



The screenshot shows the Cloudant database interface for a collection named 'medicine'. The left sidebar contains navigation options: All Documents, Query, Permissions, Changes, and Design Documents. The main area displays a table view of documents. The table has two columns: '_id' and 'name'. The documents listed are:

_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

7.5. Database Schema:



8. TESTING

8.1. Test Cases:

Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation Y/N	BUG ID	Executed By
LoginPage_TC_003	Functional	Home page	User can enter the data in specified format	To have browsers to have enhanced capabilities	URL	enter a data in specified format only	specified input is not received	Fail	Specify the User formats	NO	110	Vinay Veronica A
LoginPage_TC_004	Functional	Home page	User can enter the data in any format	User can enter the data in required format	Time(HH-MM-SS) DATE(YYYY-MM-DD)	User can enter the data in specified format now	Input received properly	Pass	Format specified	YES		Maria Anisha
UD_STORAGE_TC_005	Functional	Cloud	Verify if User input is stored in the cloud	User is able to access the URL with the given link. User has to enter the data(name,time and date) and click the SUBMIT button.Data to be stored in IBM cloud	MEDICINE NAME: Time(HH-MM-SS) DATE(YYYY-MM-DD)	User inputs has to be stored in cloud	Failed to storing the inputs	Fail	Cloud not connected properly	YES	111	Jane Ruffina Mary
UD_STORAGE_TC_006	Functional	Cloud	Verify if User input is stored in the cloud	User is able to access the URL with the given link. User has to enter the data(name,time and date) and click the SUBMIT button.Data to be stored in IBM cloud	MEDICINE NAME: Time(HH-MM-SS) DATE(YYYY-MM-DD)	User inputs has to be stored in cloud	Inputs are stored in the cloud	Pass	Cloud connected properly	YES		Preethi R
OUTPUT_TC_007	Functional	IoT device	Verify if it reminds the medicine intake to the user	Comparing the UTC time and medicine intake time	Real time and medicine intake time	Gives True when both times match	Null	Fail	Check the input.	YES	112	Vinay Veronica A
OUTPUT_TC_007	Functional	IoT device	Verify if it reminds the medicine intake to the user	Comparing the UTC time and medicine intake time	Real time and medicine intake time	Gives True when both times match	TRUE	Fail	verified	Yes		Maria Anisha
TTS_TC_008	Functional	IoT device	Verify if it gives voice notifications	When True it gives a voice notifications	Voice notifications	Voice notifications	Voice notifications: service didn't work	Fail	In program, commands are as object instead of string	NO	121	Preethi R
TTS_TC_009	Functional	IoT device	Verify if it gives voice notifications	When True it gives a voice format notifications	Voice notifications	Voice notifications	Voice notifications	Pass	New string functions were added	YES		Jane Ruffina Mary
ACK_TC_010	Functional	URL	Verify whether the patient has taken the medicine or not	The TAKEN button has been included	The status of the medicine intake	The User clicks the TAKEN button to show that medicine has been taken	Button is unfunctional	Fail	Error occurs due to failure of call and connect function of the "taken" button	NO	132	Maria Anisha
ACK_TC_011	Functional	URL	Verify whether the patient has taken the medicine or not	The TAKEN button has been included	The status of the medicine intake	The User clicks the TAKEN button to show that medicine has been taken	The Taken status is updated in the cloud	Pass	The status of the medicine intake is updated in the cloud	Yes		Vinay Veronica A

8.2. 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).

Defect Analysis:

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	5	3	1	2	11
Duplicate	2	1	0	0	3
External	2	2	0	0	4
Fixed	10	2	3	15	30
Not Reproduced	0	1	0	0	1
Skipped	0	0	2	0	2
Won't Fix	0	2	4	5	11
Totals	19	10	8	22	62

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 medicine.
- Internet 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:

- We will further extend the app where the prescriptions of the patients will be directly uploaded to the database.
- When your medicine runs low, we will reach out to third parties so you can get it delivered at your door.
- 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:

SOURCE CODE:

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQTT
#define LED 5
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);

//-----credentials of IBM Accounts-----
```

```

#define ORG "by18wl"//IBM ORGANITION ID
#define DEVICE_TYPE "IOT_DEVICE"
//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "12345"
//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "123456789"
//Token
String data3,light;
float h, t;
#define BUZZER_PIN 19
// ESP32 GIOP21 pin connected to Buzzer's pin
//----- 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/test/fmt/json";
// 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
//-----
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()// configuring the ESP32
{
    Serial.begin(115200);
    Serial.begin(9600);
    // dht.begin();
    pinMode(LED,OUTPUT);

```

```

    pinMode(BUZZER_PIN, OUTPUT);
    delay(10);
    lcd.init();
    lcd.clear();
    lcd.backlight();
    Serial.println();
    wificonnect();
    mqttconnect();
}
void loop()// Recursive Function
{
    digitalWrite(BUZZER_PIN, HIGH);
    delay(1000);
    if (!client.loop()) {
        mqttconnect();
    }
}
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.localIP());
}

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);
    light=(char)payload[2];
    Serial.println((char)payload[2]);
    for (int i = 5; i < payloadLength-1; i++) {
        Serial.print((char)payload[i]);
        data3 += (char)payload[i];
    }
    // Make sure backlight is on
    Serial.println("data: "+ data3);
    if(light=="n")

```



```

{
digitalWrite(BUZZER_PIN, HIGH);
Serial.println(data3);
digitalWrite(LED,HIGH);
// Print a message on both lines of the LCD.
lcd.setCursor(2,0); //Set cursor to character 2 on line 0
lcd.print("It's time for");
lcd.setCursor(2,1); //Move cursor to character 2 on line 1
lcd.print(data3);
delay(5000);
digitalWrite(BUZZER_PIN, LOW);
digitalWrite(LED,LOW);
//lcd.clear();
}
else
{
digitalWrite(BUZZER_PIN, LOW);
Serial.println(data3);
digitalWrite(LED,LOW);
lcd.clear();
}
data3="";
}

```

GITHUB LINK: <https://github.com/IBM-EPBL/IBM-Project-11927-1659358249>