Project Report

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 (Explain the features added in the project along with code)**
1. Feature 1
2. Feature 2
3. Database Schema (if Applicable)
8. **TESTING**
1. Test Cases
2. User Acceptance Testing
9. **RESULTS**
1. Performance Metrics
10. **ADVANTAGES & DISADVANTAGES**
11. **CONCLUSION**
12. **FUTURE SCOPE**
13. **APPENDIX**
Source Code
GitHub & Project Demo Link

Personal Assistance for Seniors Who Are Self-Reliant

Team ID	PNT2022TMID18885
Project Name	Project - Personal Assistance for Seniors Who Are Self-Reliant

1.   INTRODUCTION

1.1 Project Overview

Sometimes elderly people forget to take their medicine at the correct time. They also forget which medicine He / She should take at that time. And it is difficult for doctors/caretakers to monitor the patients around the clock. To avoid this problem, this medicine reminder system is developed. An app is built for the user (caretaker) 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.

1.2 Purpose

• To carter to the needs of the elderly lacking physical assistance during their course of medication.

• To provide better quality of life for individuals with chronic disabilities and their caregivers.

• Improved ability to stay self-sufficient at home.

2.   LITERATURE SURVEY

2.1 Existing Problem

The existing methodologies include various gadgets available to assist patients in taking their medication either bysimplifying 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

- B. B. Singh, GSM Based Automatic Pill Dispenser, vol. 7, no. 4, pp. 10694-10695, 2017.

- S. Shinde, N. Bange, M. Kumbhar and S. Patil, Smart Medication Dispenser, vol. 6, no. 4, pp. 200-204, 2017.

- S. Shinde, T. Kadaskar, P. Patil and R. Barathe, A Smart Pill Box With Remind And Consumption Using IoT, pp. 152-154, 2017.

- H. K. Wu, C. M. Wong, P. H. Liu, S. P. Peng, X. C. Wang, C. H. Lin, et al., "A Smart Pill Box with Remind andConsumption Confirmation Functions", Conf. Proc. IEEE Consumer Electronics, pp. 658-659, 2015.

- T. L. Hayes, J. M. Hunt, A. Adami and J. A. Kaye, "An Electronic Pillbox for Continuous Monitoring of MedicationAdherence", Conf. Proc. IEEE Eng. Med. Biol. Soc, pp. 6400-6403, 2006.

- S. C. Huang, H. Y. Chang, Y. C. Jhu and G. Y. Chen, "The intelligent pillbox - Design and implementation", Conf. Proc.IEEE Consumer Electronics, pp. 235-236, 2014. 7.P. H. Tsai, T. Y. Chen, C. R. Yu, C. S. Shih and J. W. S. Liu, "Smart Medication Dispenser: Design Architecture and Implementation", IEEE Systems Journal, pp. 99-110, 2010.

2.3 Problem Statement Definition

Elderly patients will try to intake medicine on prescribed time but fail to intake medicine on prescribed time because there is nocaregiver to remind, which makes them feel insecure about their health.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas
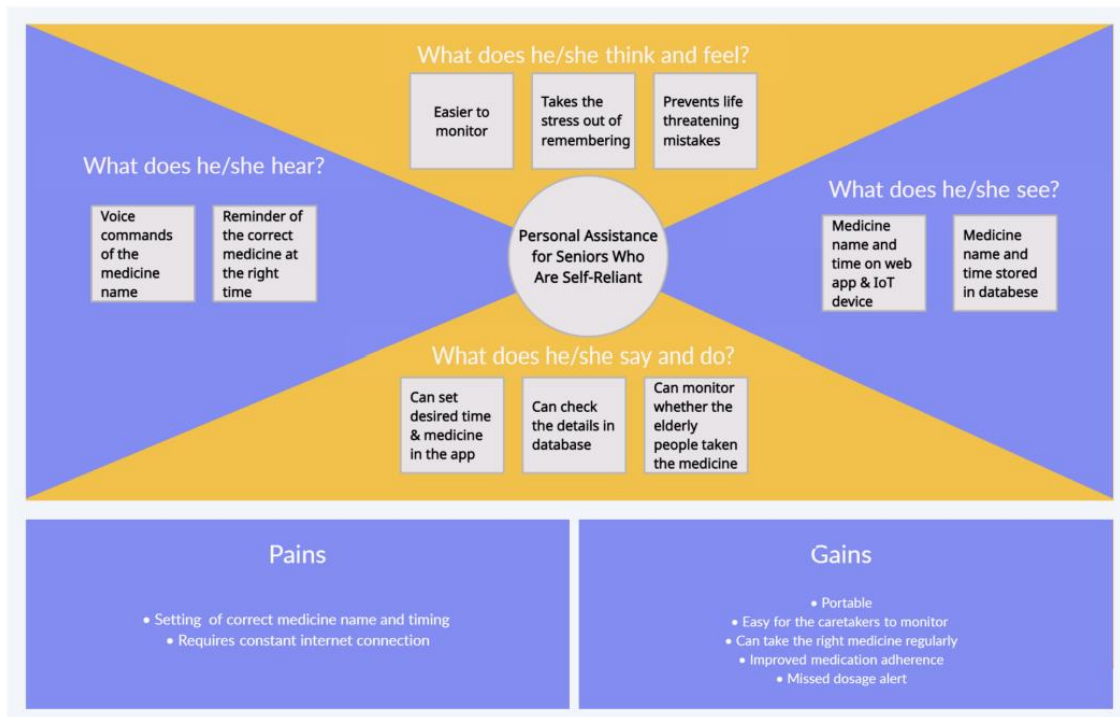
3.2 Ideation & Brainstorming

• MEDICINE REMINDER 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. To avoid this problem, this medicine reminder system is developed. An app is built for the user (caretaker) which enables him to set the desired time and medicine. These details will be stored in the database. If the medicine time arrives the web application will send the medicine name to the IoT Device through the IoT platform. The device will receive the medicine name and notify the user with voice commands.

• HEALTH MONITORING APPLICATION At least 80% of seniors suffer from one chronic condition; 68% suffer from two or more. Smart devices—i.e., blood pressure monitors, glucose meters, oximeters, and pill dispensers—can help the elderly manage these conditions. Caregivers obtain data from various devices connected to the cloud, analyze and assess everyday life patterns of senior patients, and detect health problems before they escalate. If any deviation is suspected, a healthcare worker will be automatically notified.

- PERSONAL ASSISTANT DEVICE When the elderly wears the device, the pulse sensor present in the device measures the pulse rate, later these readings and the data from different sensors are sent to the microcontroller. These measured values are sent to the doctor's application, and the caretaker can check the readings frequently. If the patient does not know how to use the mobile, then the device has some push buttons just by pressing them the alert is sent to the doctor or caretaker's mobile application.

3.3 Proposed Solution

An app is built for the user (caretaker) which enables him to set the desired time and medicine. These details will be stored in theIBM 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)	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.
2.	Idea / Solution description	The medicine reminder system is developed. An app is built for the user (caretaker) which enables him to set the desired time and medicine. These details will be stored in the database. If the medicine time arrives the web application will send the medicine name to the IoT Device through the IoT platform. The device will receive the medicine name and notify the user with voice commands.
3.	Novelty / Uniqueness	Reminds the seniors to take the right medicine at the correct time, portable and easier for the caretakers to monitor them
4.	Social Impact / Customer Satisfaction	Easier for the caretakers to monitor them and

		help the seniors to take the right medicine.
5.	Business Model (Revenue Model)	Can be sold as a subscription service.
6.	Scalability of the Solution	Since it is a web application, anyone may readily access this subscription service; all they need to do is download it and continue.

3.3 Problem Solution Fit

4.   REQUIREMENT ANALYSIS

4.1   Functional Requirements

FR No.	Functional Requirement	Sub Requirement (Story / Sub-Task)

	(Epic)	
FR-1	Authenticate user	User verification using username and password
FR-2	Time and medicine setting	Setting the details of medicine and time
FR-3	Storing the data in Cloudant DB	Stores the details of the medicine such as doses of medicine and time details in Cloudant DB
FR-4	Sending information or data	Web application send the medicine name to IoT devicethrough IoT Platform
FR-5	Giving Notification	The IoT device receives the medicine name and notify the user using voice commands

4.2 Non-Functional Requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The System should provide a systematic, simple anduser-friendly interfaces.
NFR-2	**Security**	The system must ensure all information of the registered end users are secured and not accessible by other party.
NFR-3	**Reliability**	The system should have lower risk of errors and process failures that can cause patients harm.
NFR-4	**Performance**	To perform good speed, reliability and capacity of the system is needed.
NFR-5	**Availability**	The system should be available if there are any changes to functionalities of the system in future.
NFR-6	**Scalability**	The system is scalable to increase or decrease in performance according to requirements

5. Problem Solution Fit

5.1 Data Flow Diagrams
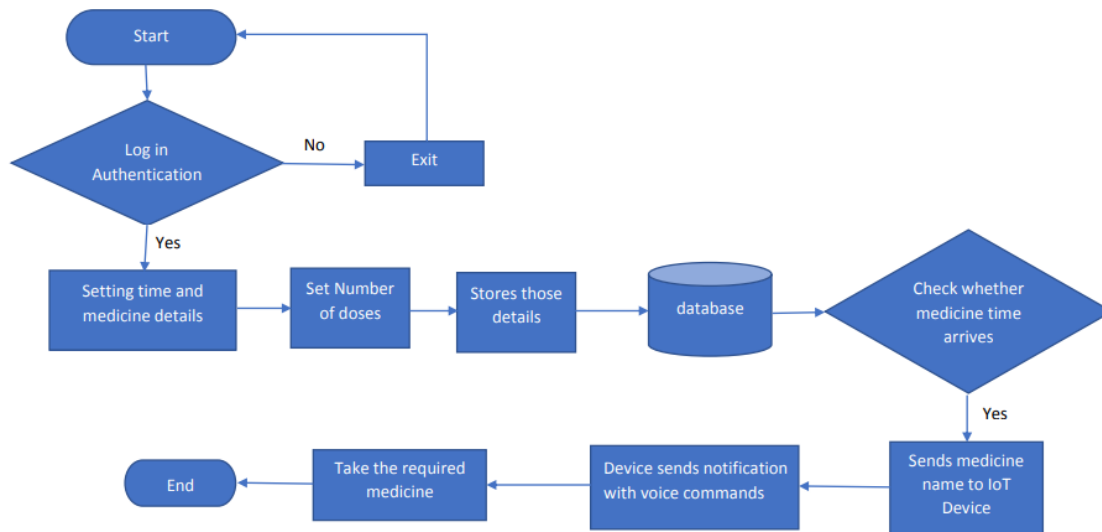
5.2 Solution & Technical Architecture
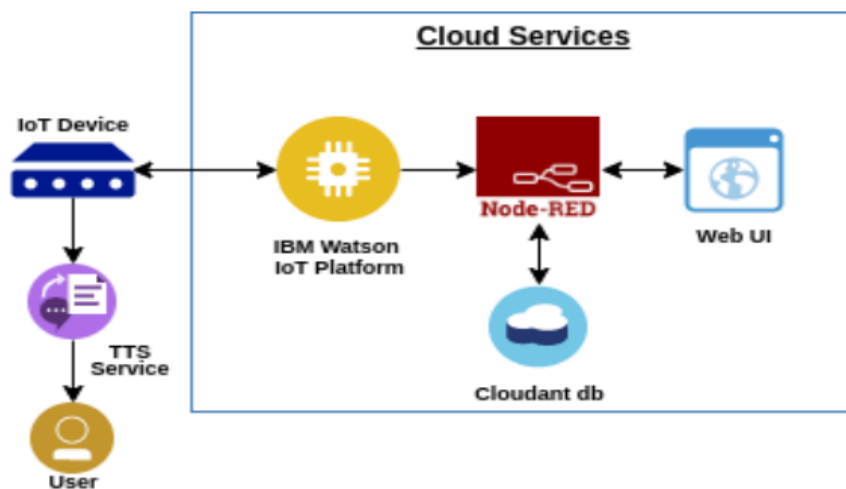
5.3   User Stories

| 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 & SCHEDULING

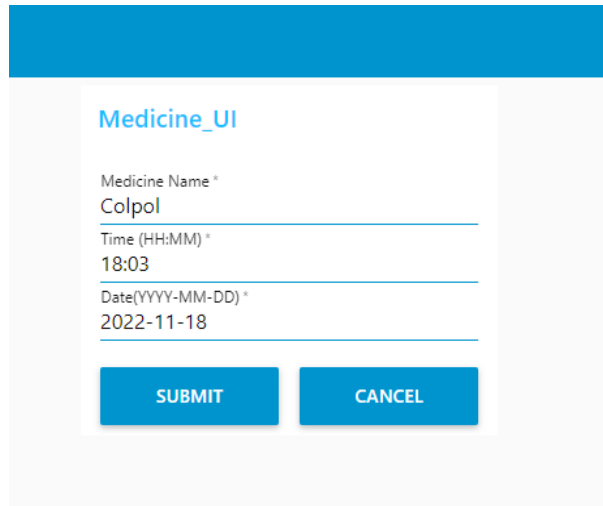## 6.1 Sprint Planning & Estimation
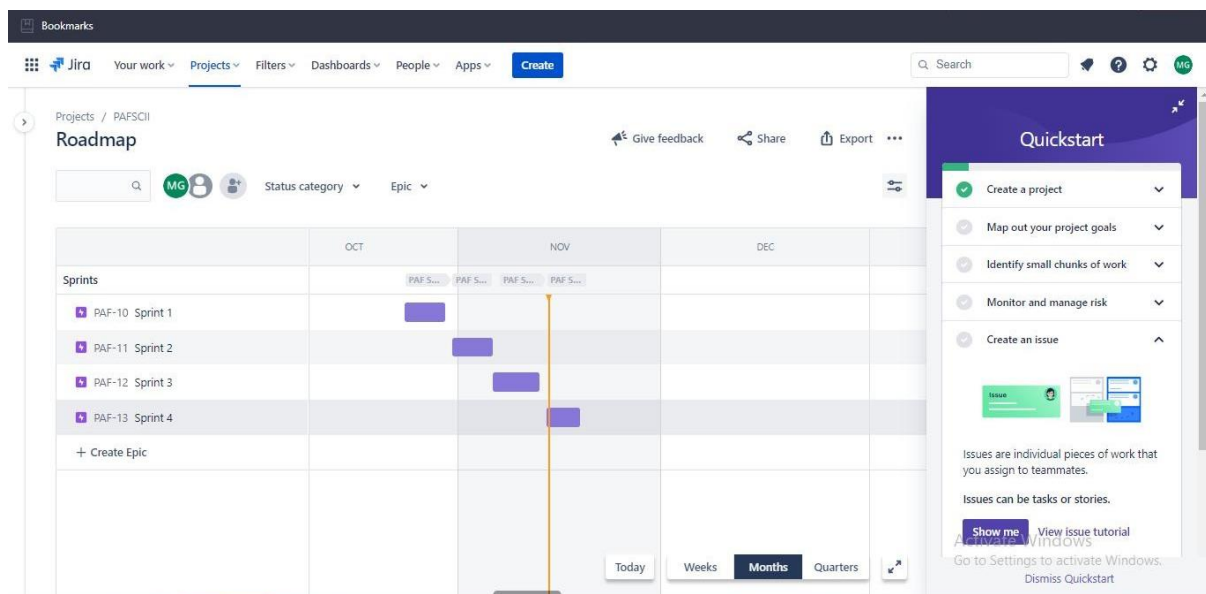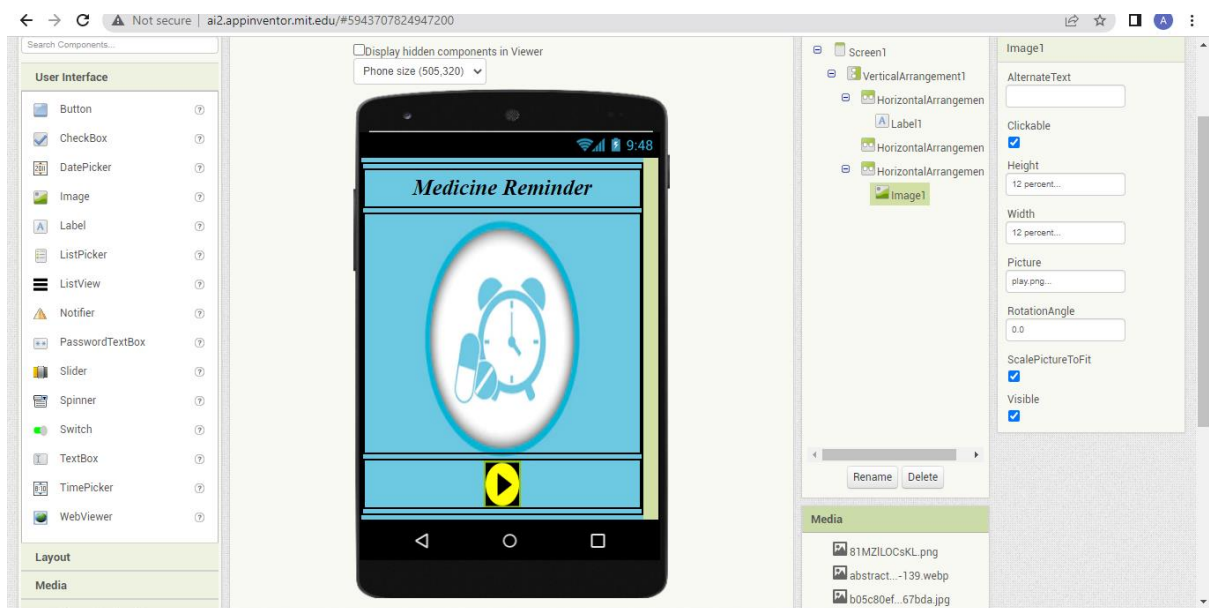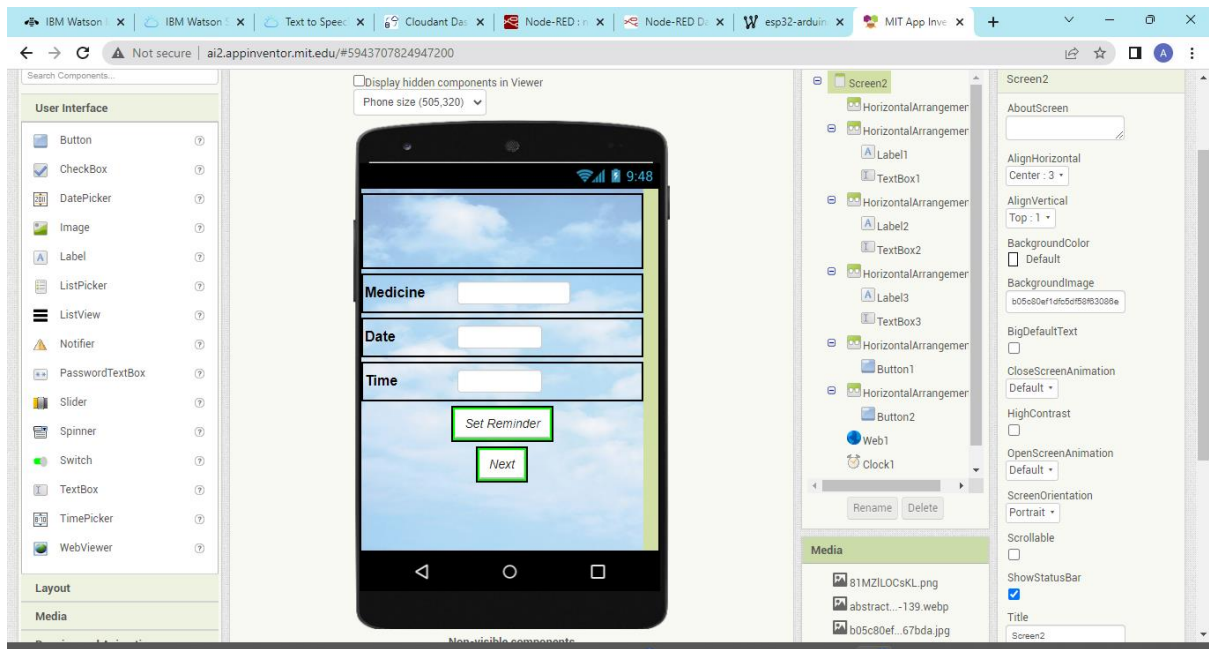
7. CODING & SOLUTIONING

Features

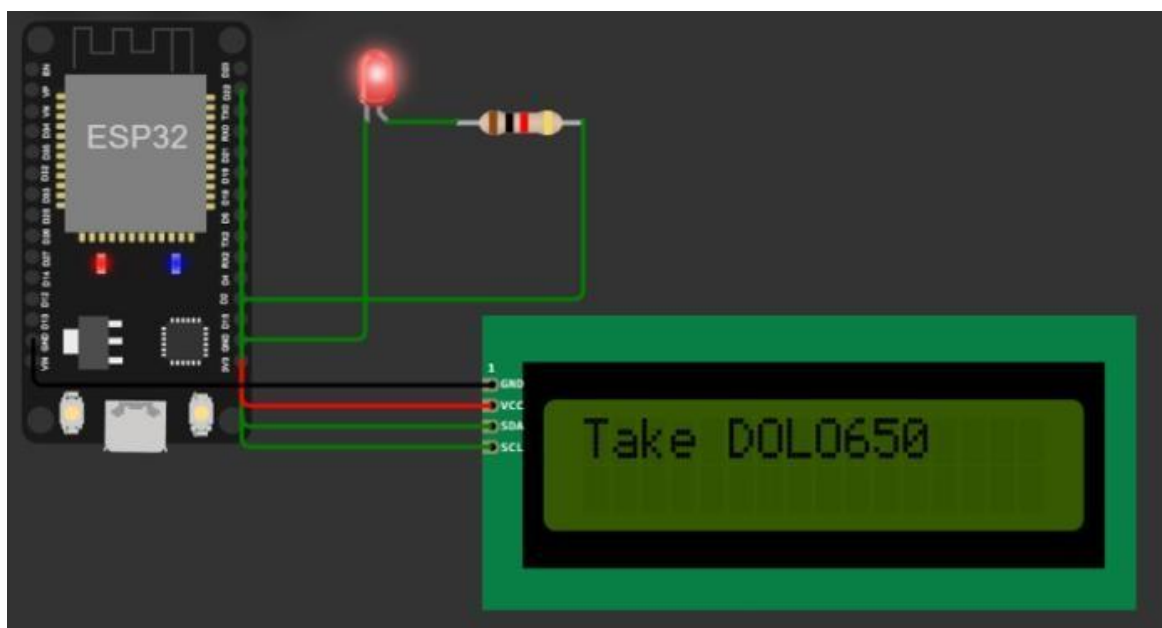## #1 Web UI to schedule medicine name and intake time:

#2 Sending the medicine name as Voice output at the scheduled time

#3 Displaying the medicine name on the IoT device at the scheduled time

#4 Secure data transmission and storage with IBM Cloudant database

Database Schema


```
id  "2022-11-11 20:16"

{
  "id": "2022-11-11 20:16",
  "key": "2022-11-11 20:16",
  "value": {
    "rev": "1-4910298aee742c3f200a0e4191701a3a"
  },
  "doc": {
    "_id": "2022-11-11 20:16",
    "_rev": "1-4910298aee742c3f200a0e4191701a3a",
    "name": "Dolo-650"
  }
}
```

8. Testing:
8.1 Test cases Reports:

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Resu
LoginPage_TC_OO1	UI	Home Page	Verify whether user is able to access the URL	APP URL	https://node-red-xewvl-2022-11-12.eu-gb.mybluemix.net/red/#flow/0ba8431f5cfb1ad9	URL	Able to access the URL	failed to acce mobile
LoginPage_TC_OO2	UI	Home Page	Verify whether user is able to access the URL	APP URL	https://node-red-xewvl-2022-11-12.eu-gb.mybluemix.net/ui/#!/0?socketid=eKgKuO_uTp 2i2A0xAACj	URL	Now User able to access the URL	Able to acces mobile
LoginPage_TC_OO3	Functional	Home page	User can enter the data in specified format	APP URL	To have browsers to have enhanced capabilities	URL	enter a data in specified format only	specified inp not receive
LoginPage_TC_OO4	Functional	Home page	User can enter the data in any format	APP URL	User can enter the data in required format	Time(HH:MM): DATE(YYYY-MM-DD):	User can enter the data in specified format now	Input recei properly
CLOUD_STORAGE_TC_00!	Functional	Cloud	Verify if User input is stored in the cloud	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) : DATE(YYYY-MM-DD):	User inputs has to be stored in cloud	Failed to sto the input
CLOUD_STORAGE_TC_OO	Functional	Cloud	Verify if User input is stored in the cloud	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) : DATE(YYYY-MM-DD):	User inputs has to be stored in cloud	Inputs are st in the clou
OUPUT_TC_007	Functional	Iot device	Verify if it reminds the medicine intake to the user	IOT device	Comparing the UTC time and medicine intake time	Real time and medicine intake time	Gives True when both times match	Null
OUPUT_TC_007	Functional	Iot device	Verify if it reminds the medicine intake to the user	IOT device	Comparing the UTC time and medicine intake time	medicine intake time	Gives True when both times match	TRUE
TTS_TC_008	Functional	Iot device	Verify if it gives voice notifications	IOT device and TTS	When True it gives a voice notifications	Voice notifications	Voice notifications	Voice notifica service didn't
TTS_TC_009	Functional	Iot device	Verify if it gives voice notifications	IOT device and TTS	When True it gives a voice format notifications	Voice notifications	Voice notifications	Voice notifice arrived

Expected Result	Actual Result	Status	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
Able to access the URL	failed to access in mobile	Fail	Wrong Browser selected	NO	101	Bhavani R K
Now User able to access the URL	Able to access in mobile	Pass	Able to access in Chrome and Edge	YES		Akshayasri S
enter a data in specified format only	specified input is not received	Fail	Specify the User formats	NO	110	Kawin M
User can enter the data in specified format now	Input received properly	Pass	Format specified	YES		Anne Angelina J
User inputs has to be stored in cloud	Failed to storing the inputs	Fail	Cloud not connected properly	YES	111	Kawin M
User inputs has to be stored in cloud	Inputs are stored in the cloud	Pass	Cloud connected properly	YES		Akshayasri S
Gives True when both times match	Null	Fail	Check the input	YES	113	Anne Angelina J
Gives True when both times match	TRUE	Fail	verified	Yes		Bhavani R K
Voice notifications	Voice notifications service didn't work	Fail	In program, commands are as object instead of string	NO	121	Akshayasri S
Voice notifications	Voice notifications arrived	Pass	New string functions were added	YES		Kawin M

8.2 User Acceptance Testing (UAT):

Purpose of the document:

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

Defect Analysis:

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

S.No	Project Overview	NFT Test approach	End Of Test				
			NFR - Met	Test Outcome	GO/NO-GO decision	Recommendations	Ide (Detec
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	
		1	Personal Assistance For Seniors who are Self-	LOAD	Dependencies	SignOff	

S.No	Project Overview	NFT Test approach	End Of Test				
			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

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

10. ADVANTAGES & DISADVANTAGES

Advantages:

- Helpful for people who have no caretakers and helps people to take medicines on time by voice command.
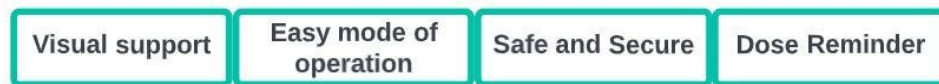
Disadvantages:

- 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 pilldispenser will be in assisting individuals in better self-managing theirmedications. 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 sothat refill time can be calculated.

13. APPENDIX

LINKS

GITHUB: https://github.com/IBM-EPBL/IBM-Project-26502-1660028647

NODE-RED: https://node-red-xevwl-2022-11-12.eu-gb.mybluemix.net/red/#flow/0ba8431f5cfb1ad9

WOKWI: https://wokwi.com/projects/348658921773204050

SOURCE CODE:

```
#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------
```

```cpp
#define ORG "brtbli"//IBM ORGANITION ID
#define DEVICE_TYPE "Mydevice01"//Device type mentioned in ibm watson IOT
Platform
#define DEVICE_ID "12345"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "9uhV*uqZLpBlHUXugg"      //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/medicine/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);
  delay(10);
  Serial.println();
  wificonnect();
  mqttconnect();
}

void loop()// Recursive Function
{
  if (!client.loop()) {
    mqttconnect();
  }
}

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


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

```arduino
      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);
  for (int i = 0; i < payloadLength; i++) {
    //Serial.print((char)payload[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="";


}
```