

PROJECT REPORT

Personal Assistance for Seniors Who Are Self-Reliant

1.Introduction

1.1 Project Overview

1.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.

2.If the medicine time arrives the web application will send the medicine name to the IOT Device through the IBM IOT platform.

3.The device will receive the medicine name and notify the user with voice commands.

1.2 Purpose

1.Sometimes elderly people forget to take their medicine at the correct time.

2.They also forget which medicine He/she should take at that particular time.

3.And it is difficult for doctors/caretakers to monitor the patients around the clock.

To avoid this problem, this medicine remainder system is developed.

2.Literature Survey

2.1 Existing Problem

Elderly people let slip the medications at the correct time and the existing solutions for this problem is setting remainders or using pill boxes ,calendars ,Personal Assistance. Though the solutions give remainders, the voice commands or assistance given by this system is more efficient.

2.2 References

1.Visual Health Remainder: A remainder for Medication Intake and Measuring Blood Pressure to Support Elderly People; Rene Baranyi; Sascha Rainer; Stefan Schlossarek; Nadja Lederer; Thomas Grechenig.

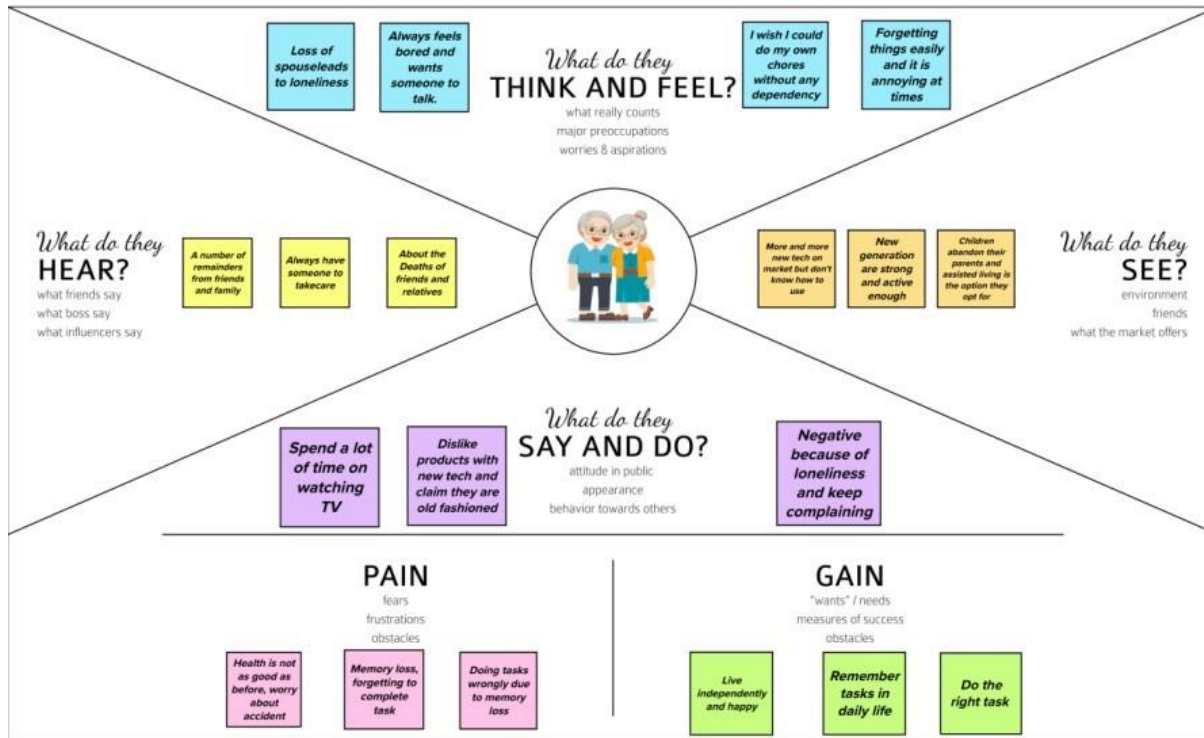
2.Cloud Computing based Medical Assistance & Pill Remainder; A.Chinnasamy; Ram Prasad J; Syed Rafeeq Ahmed; Akash S.

2.3 Problem Statement Definition

Skipping medicines can be serious for some health conditions. Sometimes elderly people forget to take their medicine at the correct time.They also forget which medicine one should take at that particular time and it is difficult for doctors/caretakers to monitor the patients around the clock.

3.Ideation and Proposed Solution

3.1 Empathy Map Canvas



3.2 Ideation and Brainstorming

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

🕒 10 minutes

TIP
You can select a sticky note and hit the pencil (switch to sketch?) icon to start drawing!

M.PAVITHRA

Creating alarm system	pill box	Reminder message
voice assistant	Writing about prescriptions	taking notes
Creating app	Creating reliable user interface in app	Phone voice reminder

J.E VIJAY

Doctor to patient connection	app for reminding	checklist
chart of medicine	medical watches	high tech pill box
prepackaged dose from pharmacy	clock and calendar app	to-do list

S.HARIKRISHNAN

placing medicine in room often visited	placing to-do list wherever u often see	place brightly colored sticky notes
seven-day chart with each dose	to-do list including medication	check boxing monthly calendar
alarm paired with daily checklist	wearing medical watch	creating habit by doing things regularly

G.SANTHOSH

To keep track their medication	Application should be customizable	Place a note on the kitchen table or the refrigerator for medicine medications
Customer requirements should full filed	It should dial Emergency contact	Set an alarm or reminder on your mobile device
play a game designed to motivate creating new habits	pre-pool medications into a pill box	taking clock that shows a family member to record reminders

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

🕒 20 minutes

TIP
Add customizable tags to sticky notes to make it easier to find, limit, organize and categorize important ideas as themes within your mural.

3.3 Proposed Solution

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Some people find it difficult to learn new apps in this ever-expanding digital environment and people nowadays tend to forget things more easily, such as taking their prescriptions. People need a way to remember to take their prescriptions without having to learn how to use sophisticated programs.
2.	Idea / Solution description	Create a basic, easy-to-use app so that users don't forget their medicine schedules, can easily discover pharmacies and clinics near them, and can be directed through the app by their loved One's if necessary.
3.	Novelty / Uniqueness	My research began with a series of inquiries directed at a variety of people in order to have a better understanding of their issues and demands in remembering their routines. The purpose of this study was to gain a better understanding of individuals and their needs, as well as to put them at the centre of our design Process and product.
4.	Social Impact / Customer Satisfaction	I constructed these proto-personas, or names, based on the research findings from the user interview. They would be crucial to the rest of the design process. All design decisions may be Assessed and re-evaluated using these persons ,keeping the user and their perspective in mind.
5.	Business Model (Revenue Model)	By using the model, we can collect basic and some medical information about the persona that helps us in showing relevant and profitable advertisements.
6.	Scalability of the Solution	As the model is integrated with cloud software, we can update the user experience without reinstalling a model and the persona can keep a Reminder up to year.

3.4 Problem Solution Fit

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CS Who is your customer? i.e. working parents of 0-5 y.o. kids. Customer is a old man or woman who is suffering from some health issues who doesn't have a personal care taker to give prescribed medicine on time.	6. CUSTOMER CONSTRAINTS CC What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices. The customer is unaware of the prescription due to lack of knowledge to read a particular prescription. He/ She is forgetting to take medicine on time before and after food because no care taker to remind.	5. AVAILABLE SOLUTIONS AS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking. If the medicine time arrives the web application will send the medicine name to the IOT device. The device will receive the medicine name and notify the user with voice commands.	Explore AS, differentiate
	2. JOBS-TO-BE-DONE / PROBLEMS J&P Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides. <ul style="list-style-type: none"> Forgot to take medicine The person will be notified to take medicine in a right time using alert messages 	9. PROBLEM ROOT CAUSE RC What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. The seniors don't have care taker to guide them to take medicine according to the prescription because care taker lead their own life with their busy schedules so there is need of additional source.	7. BEHAVIOUR BE What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)	
Focus on J&P, fit into BE, understand RC	3. TRIGGERS TR What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. Promote the usage of app through advertisements Seniors with learning disabilities may also triggers the usage of app	10. YOUR SOLUTION SL If you are working on an existing business, write down your current solution first, fit it in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour. An app is build for the user which enables him/her to set the desired time and medicine name to the IOT device. The device will receive the medicine name and notify the user with voice commands.	8. CHANNELS of BEHAVIOUR CH 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7 *Upload details about medicine and get alert messages on correct time 8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. *Setting alarm at the correct time	Focus on J&P, fit into BE, understand RC
	4. EMOTIONS: BEFORE / AFTER EM How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure - confident, in control - use it in your communication strategy & design. *Feeling taking correct medicines at correct time After the usage of app they feel healthy			
Identify strong TR & EM				Extract online & offline CH of BE

4.Requirement Analysis

4.1 Functional Requirements

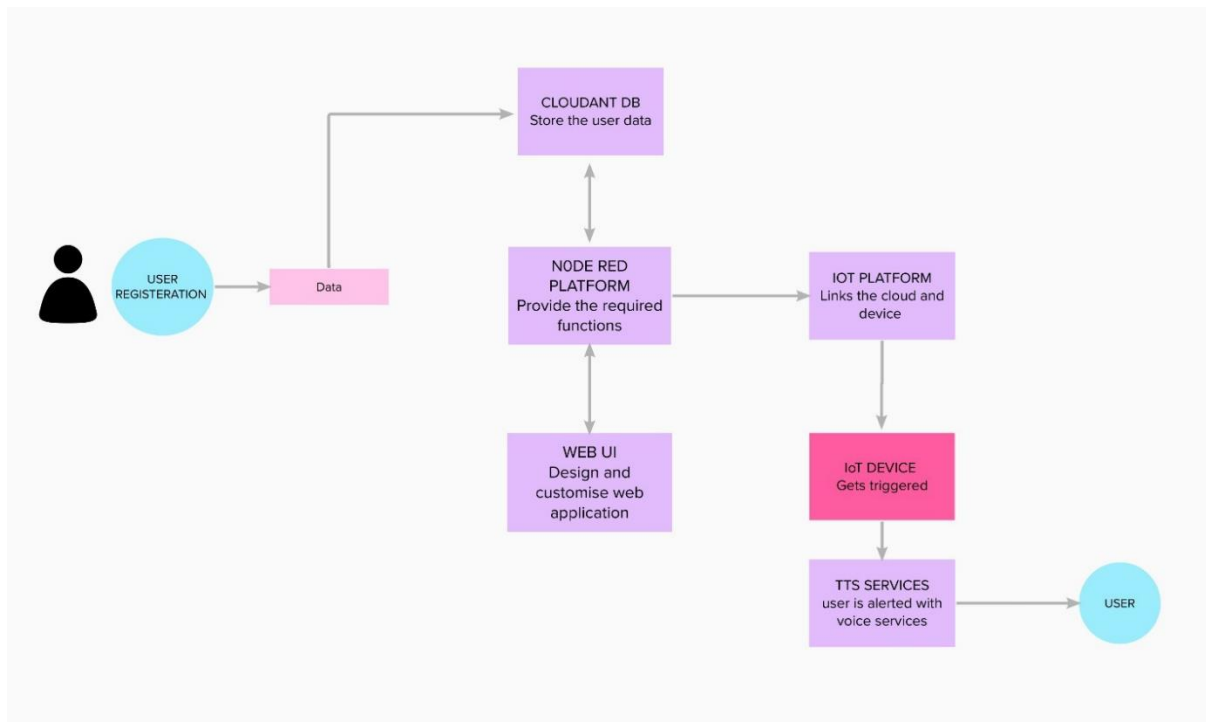
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration has been done through the form in our application.
FR-2	User Confirmation	Confirmation has been done within our application.
FR-3	Data management	All the data are stored in the cloud and retrieved when it is needed.
FR-4	Internet Connectivity	Users should have a stable internet connection to access the Application.
FR-5	User Input management	All the user's data are gotten with the help of a text field in the dashboard in the app.
FR-6	Acknowledgement	All the data are stored in the cloud via the app and acknowledgment will be given to the user.

4.2 Non-Functional Requirements

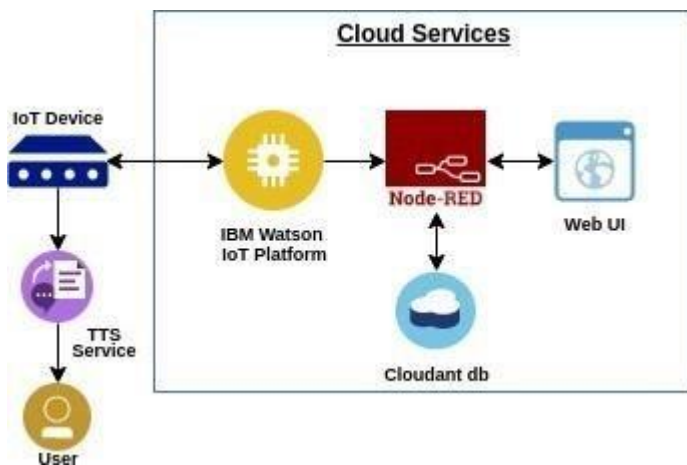
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Smart medicine box usability is the characteristics of the user that facilitate. Use, to make it easier for the user to perceive the information presented by the user interface, to understand and decide based on that information.
NFR-2	Security	Smart medicine box, like other computer systems, can be vulnerable to security breaches, potentially, impacting the safety and effectiveness of the device.
NFR-3	Reliability	The probability of medicine box will perform a required function without failure under stated conditions for a specific period.
NFR-4	Performance	Medical device testing is the process of demonstrating that the device will reliably and safely perform in use.
NFR-5	Availability	Medicine box is availability over all the conditions of weather and atmosphere pressure and be carried out with us.
NFR-6	Scalability	In feature we can upgrade the smart medicine box to the health care assistant to monitor our health care and book appointments to doctor.

5. Project Design

5.1 Data Flow Diagrams



5.2 Technical Architecture



5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Senior user)	caretaker	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 (Diabetes 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 (Thyroid Patient)	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	Medium	Sprint-2
Customer (Coma Patient)	Caretaker	USN-4	As a user, my patient needs medication time and prescription should load in database for upcoming week	My patient medication time and prescription should be in database list	low	Sprint-4

Customer (Disabled People's)	Smart medicine box	USN-5	As a user, I need to take my medicine in nearby places with light notification	I need to take my medicine in nearby places with light notification	Medium	Sprint-3
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6. Project Planning and Scheduling

6.1 Sprint Planning and Estimation

Sprint	Functional Requirements(Epic)	User Story Number	User Story/Task	Story Points	Priority	Team Members
Sprint-1	Buzzer (Set Alarm)	USN-1	As a user, I can set an alarm to alerting a medicine through medicine remainder system	10	High	Pavithra.M Vijay J.E Harikrishnan.S Santhosh.G
Sprint-1	Form	USN-2	As a user, I can Activate and Deactivate the alarm	10	High	Pavithra.M Vijay J.E Harikrishnan.S Santhosh.G
Sprint-2	Cloudant	USN-3	As a user once I can the set the alarm then I gets the notification	1	Low	Pavithra.M Vijay J.E Harikrishnan.S Santhosh.G
Sprint-2	Task	USN-4	Create All the Required Specification s (Node Red, IoT Device, Cloud, etc.)	19	High	Pavithra.M Vijay J.E Harikrishnan.S Santhosh.G
Sprint-3	Task	USN-5	Connecting the Node red, cloud, IoT	18	High	Pavithra.M Vijay J.E

			Device, Web UI, IoT Watson, TTS Service,			Harikrishnan.S Santhosh.G
Sprint-3	Cloud	USN-6	As a user, I can store the name of the medicine with its description	2	Medium	Pavithra.M Vijay J.E Harikrishnan.S Santhosh.G
Sprint-4	Device	USN-7	As a user, they can also help large hospitals and clinics manage their inventory more effectively	10	Low	Pavithra.M Vijay J.E Harikrishnan.S Santhosh.G
Sprint-4	Device, Cloud	USN-8	As a user, they used for keeping the record in medicine details the reminding the schedule of medicine. We have used the IoT enabled arduino device for monitoring the system	10	High	Pavithra.M Vijay J.E Harikrishnan.S Santhosh.G

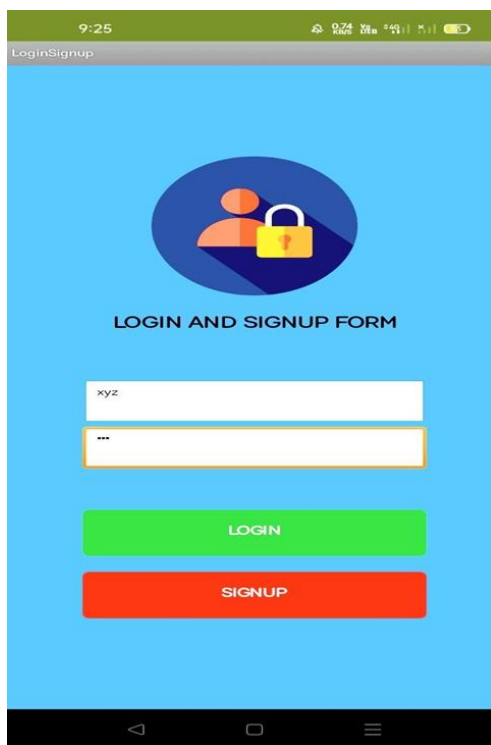
6.2 Sprint Delivery Schedule

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	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	13 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	20 Nov 2022

7.Coding and Solutioning

7.1 Feature 1


The mobile application developed has a feature of individual login by different users.



7.2 Feature 2

The mobile application also has the feature of uploading medicine names in the cloud.

Medicine Alarm



Enter Your Medication Details:

MEDICINE NAME:

MEDICINE DOSAGE:

SELECT TIME:

SELECT DATE:

☐ Tick the check Box when you take the medicines

7.3 Feature 3

The project includes a cloud database system.

medicines

All Documents

Query

Permissions

Changes

Design Documents

Document ID

Options

JSON

Table

Metadata

JSON

Create Document

	_id	name
<input type="checkbox"/>	00:46	asdas
<input type="checkbox"/>	00:48	dfgdfg
<input type="checkbox"/>	01:01	Crocin
<input type="checkbox"/>	01:06	sddf
<input type="checkbox"/>	01:08	dfsdf
<input type="checkbox"/>	01:10	sdfsd
<input type="checkbox"/>	01:19	sadsd
<input type="checkbox"/>	01:22	dfgdfg
<input type="checkbox"/>	01:23	asdasd

Showing 2 of 3 columns. ☐ Show all columns.

Showing document 1 - 30. Documents per page: 30

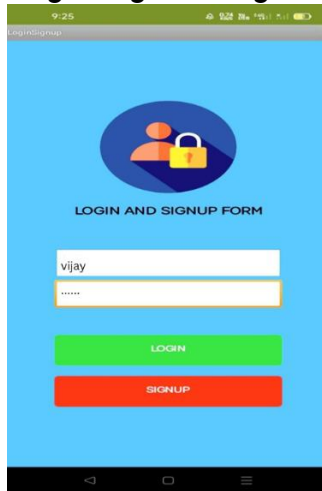
8. Testing

8.1 Test Cases

Test case	Precondition	Test steps	Test data	Expected result
Verify login with valid credentials	User should have a network connection	1. Launch URL 2. Enter valid username. 3. Enter valid password. 4. Click on the "Login" button.	Username: vijay Password: 1234@!	Users should be able to login successfully.
Verify login with invalid credentials	User should have a network connection	1. Launch URL 2. Enter valid username. 3. Enter invalid password. 4. Click on the "Login" button.	Username: vijay Password: 1234@!	Users should not be able to login.
Update the medicine name with the time.	User should have a network connection	1. Enter valid medicine name. 2. Enter the time when the medicine has to be consumed. 3. Click on the "Submit" button.	Medicine Name: Crocin Medicine Time: 20.00	Users should be able to update it successfully.

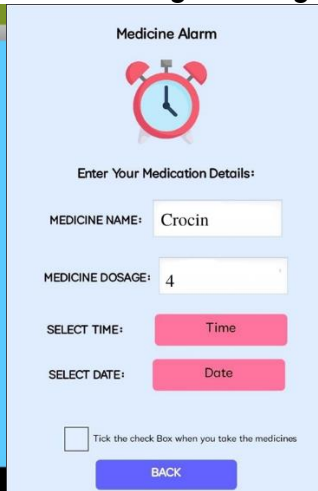
8.2 User Acceptance Testing

Login Page Testing



The screenshot shows a mobile application interface for a login and signup form. At the top, there is a blue header with a white lock icon and the text "LOGIN AND SIGNUP FORM". Below this, there are two input fields: the first contains the name "vijay" and the second is empty. Below the input fields are two buttons: a green "LOGIN" button and a red "SIGNUP" button. The background is a light blue gradient.

Medicine Page Testing



The screenshot shows a mobile application interface for a medicine alarm. At the top, there is a blue header with a white alarm clock icon and the text "Medicine Alarm". Below this, there is a section titled "Enter Your Medication Details:". This section contains four input fields: "MEDICINE NAME:" with the value "Crocin", "MEDICINE DOSAGE:" with the value "4", "SELECT TIME:" with a dropdown menu showing "Time", and "SELECT DATE:" with a dropdown menu showing "Date". Below these fields is a checkbox labeled "Tick the check Box when you take the medicines". At the bottom, there is a blue "BACK" button. The background is a light blue gradient.

9.Results

9.1 Performance Metrics

S. NO	Parameter	Performance
1.	Response Time	0.2s (Average of 10 trials)
2.	Workload	500 users (Calculated based on Cloud Space)
3.	Revenue	Individual users and pharmaceutical industries.
4.	Efficiency	Simple and straightforward workflow, which makes the process efficient.
5.	Down Time	Almost no down time due to IBM Cloud enabled solution.

10.Advantages and Disadvantages

Advantages

- 1.Help the elderly people to take their medicine at the correct time.
- 2.Avoid personal assistants or caretakers needed for medically sick people.
- 3.Cost efficient.
- 4.Can store multiple data and many notifications can be generated.

5. Since it includes voice assistance, even blind people can use our device.

Disadvantages

1. Makes people lethargic and makes them dependent always on others.
2. Requires a stable internet connection.

11. Conclusion

The project offers the elderly or medically sick people a personal assistant which reminds them of the medicines to be consumed at the particular time. Skipping tablets may lead to serious problems if the person has a severe illness and this can be avoided. Since the cloud is integrated with the mobile applications, numerous data can be fed into the database and notifications can be generated. The mobile application developed is highly customisable by the user and easy to use.

12. Future Scope

The project can be further developed by bringing into the feature of informing the medicine name during the notification. The voice assistants which is given can be customized by adding the user's voice or the caretaker's voice. Further the mobile application can update medicines by taking voice commands as an input from the user.

13. Appendix

Source code:

```
#include <WiFi.h> //library for wifi
#include <PubSubClient.h> //library for MQTT
#include <LiquidCrystal_I2C.h>
#define LED 2
void callback(char* subscribtopic, 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 subscribtopic[] = "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);
  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 ");
    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="";
}

```

GitHub Link: <https://github.com/IBM-EPBL/IBM-Project-37511-1660310975>

Project Demo Link: <https://youtu.be/F-YXtcxXoKY>