

Personal Assistance for Seniors Who Are Self-Reliant - Project Report

1. Introduction

1.1 Project Overview

- 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

- 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.

2 .Literature survey

2.1 Existing problem

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

2.2 References

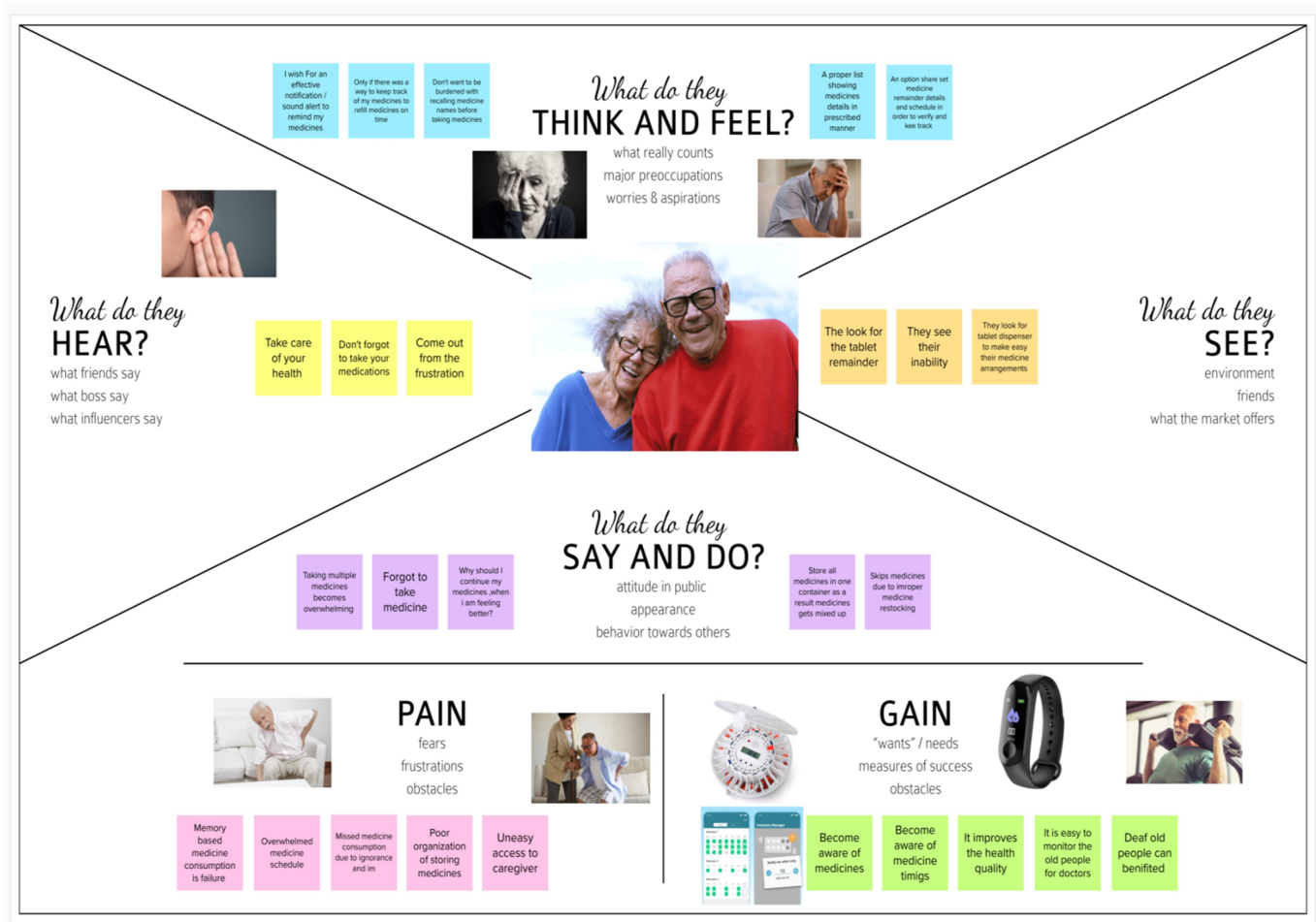
- 1) Visual Health Reminder: A Reminder for Medication Intake and Measuring BloodPressure to Support Elderly People ; René Baranyi; Sascha Rainer; Stefan Schlossarek; Nadja Lederer; Thomas Grechenig
- 2) Cloud Computing based Medical Assistance & Pill Reminder ; A. Chinnasamy; Ram Prasad J; Syed Rafeeq Ahmed; Akash S

2.3 Problem statement definition

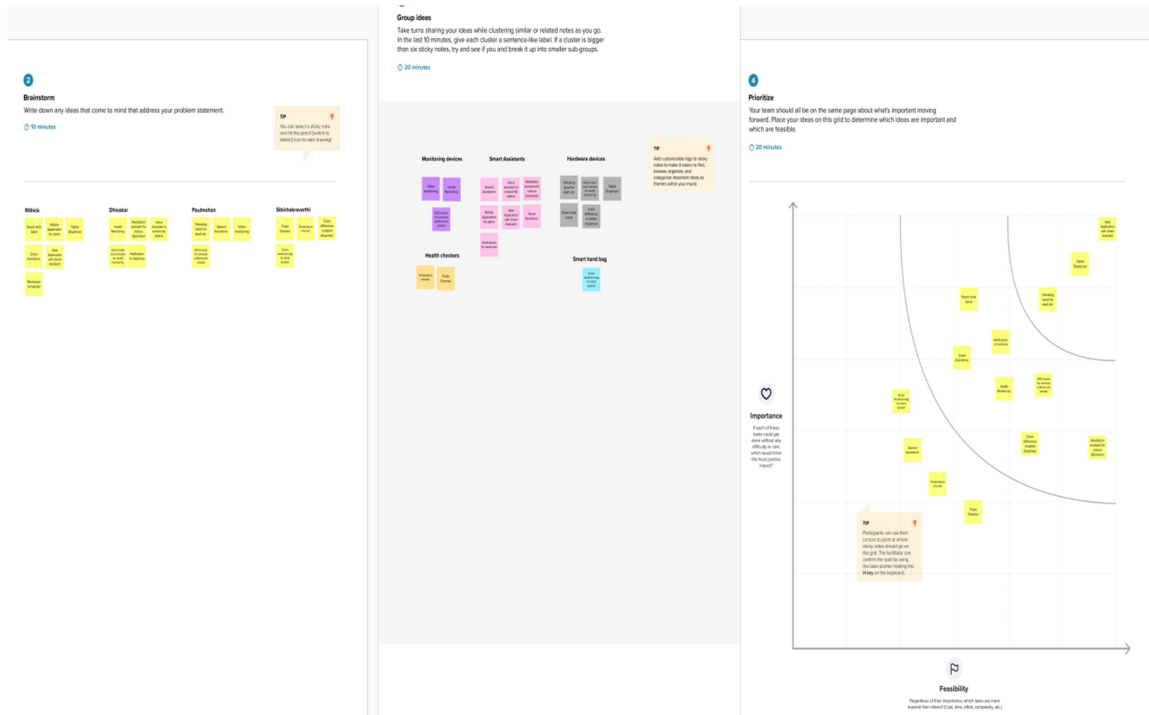
Skipping medicines can be serious for some medical health conditions; Sometimes elderly people forget to take their medicine at the correct time. They also forget which medicine one should take at that particular time. And it is difficult for doctors/caretakers to monitor the patients around the clock.

3. Ideation and proposed solution

3.1 Empathy Map Canvas



3.2 Ideation and Brainstorming



3.3 Proposed solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	<ul style="list-style-type: none"> ➤ Sometimes elderly people forgot take their medicine at the correct time. ➤ Then also forget which medicine should be taken at that particular time. And it is difficult for doctors/caretakers to monitor the patients around the clock.
2.	Idea/Solution description	<ul style="list-style-type: none"> ➤ A 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. ➤ It 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.
3.	Novelty/Uniqueness	➤ Keeping track of the medicines taken by the user at each time interval. ➤ Information is stored in the secured IBM cloud.
4.	Social Impact/Customer Satisfaction	➤ The reminder system enables the user to take tablets at regular intervals prescribed by the physicians.
5.	Business Model(Revenue Model)	➤ Direct Mode: We gain revenue from selling the medical reminder system to hospitals, medical health centre and even in old age homes. ➤ Indirect Mode: We gain profit by having partnership with pharmaceutical companies.
6.	Scalability of the Solution	➤ The medical alert system can be used in Hospitals , medical health centres and even in old age homes for dispensing medicines.

3.4 Problem Solution fit

Define CS, fit into CC

1. CUSTOMER SEGMENT

Citizens who are in need of external support to take care of themselves for medical assistance .

CS

6. CUSTOMER CONSTRAINTS

Accurate measuring for the time.
 Limited usage for only pill and capsulesdrug dosage.
 Control of energy saving devices.

CC

5. AVAILABLE SOLUTIONS

AS

The solution of this sophistication is supplemented by the development of an advanced technology supported pill dispenser called the GSM based automatic call dispenser .

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS

J&P

This Application helps the patient to remind medicine through voice assistance . It helps the user to do their daily routine without seeking help from other people.

9. PROBLEM ROOT CAUSE

RC

Side-effects affecting thinking and balance. Sedatives and tranquilizers, which are often prescribed for sleep or for anxiety. Examples include zolpidem and lorazepam (brand names Ambien and Ativan , respectively). These drugs can increase fall risk, or can provoke confusion. Geriatricians commonly recommending stopping or reducing the dosage of these drugs. For more information about four types of medication that affect memory .

BE

7. BEHAVIOUR

The patient need to update the information about their medication , life routines to the application

3. TRIGGERS

TR

Identify strong TR & EM

People simply forget , skip or stop taking their medications ... which leads to non adherence . Trigger helps people to integrate healthy behavior by using technology in a very simple way .

10. YOUR SOLUTION

SL

Building a reliable technology that can address all the customer needs while being reliable and secure ensuring efficient functioning.

8.CHANNELS of BEHAVIOUR

C

The data stored in the Application can be access with the help of internet .

4.EMOTIONS

EM

Despite effective treatments , depression may often un recognize and untreated . 2,3 many persons in the community with depression see a general physician . so primary care setting is pivotal when considering how to optimize the treatment for depression and others forms of emotional distress in the community

4. Requirement analysis

4.1 Functional Requirements:

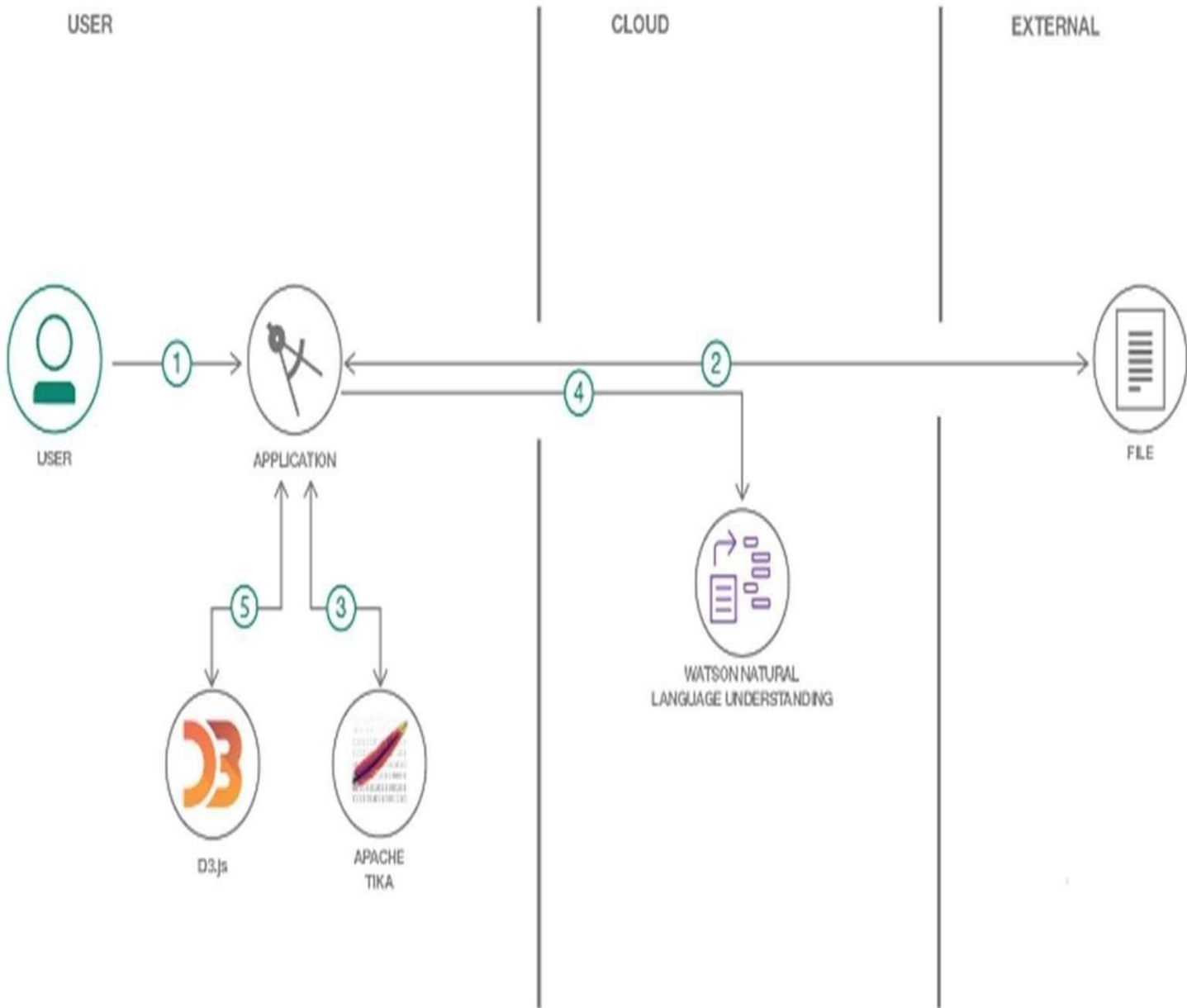
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Gmail Registration by phone number
FR-2	User Confirmation	Confirmation via Email Confirmation through SMS/Messages
FR-3	User Login (Web)	Login with registered mail id and password
FR-4	User Login (mobile app)	Login with registered mobile number and password
FR-5	User's Medical Information	In the app ,enter your medicine details with date. Then set the time in the app for alarm remainder.

4.2 Non- Functional Requirements:

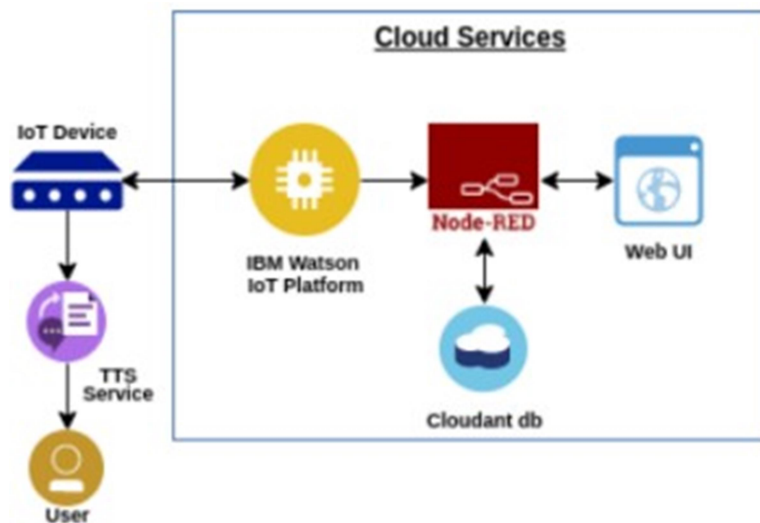
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	<ul style="list-style-type: none">➤ The system should be user-friendly for the users. It is used to remind the medicine names.➤ It alerts the users through voice commands.
NFR-2	Security	<ul style="list-style-type: none">➤ The login information should not be accessed by any other users than the respective user.➤ The data of the users should be kept confidential.
NFR-3	Reliability	<ul style="list-style-type: none">➤ It reminds on correct time.➤ The user data should be updated and examined after certain period of time.
NFR-4	Performance	<ul style="list-style-type: none">➤ The voice message will be delivered accurately to the given time.➤ It works without any connection interruption
NFR-5	Availability	<ul style="list-style-type: none">➤ The system should be monitored 24X7 for the alert of medicines.➤ It can be used by any registered users from any place.
NFR-6	Scalability	<ul style="list-style-type: none">➤ The application can handle any number of registration.➤ It is easily adaptable.➤ The device is compatible and portable.

5. Project Design

5.1 Data Flow Diagrams



5.2 Technical Architecture



5.3 User Stories

UserTy pe	Functional Requirement (Epic)	User Story Numb er	UserStory/Task	Acceptance criteria	Priori ty	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register For the application by entering my email or mobile number, password, and confirming my password.	I canaccess myaccount /dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email& click confirm	High	Sprint-1
		USN-3	Asauser,Icanregisterfort heapplication throughGmail		Medi um	Sprint-1
	Login	USN-4	As a user, I can log intothe application byentering email or mobilenumber&passwo rd	I canaccess myaccount /dashboard	High	Sprint-1

User Type	Functional Requirement (Epic)	User story Number	UserStory/Task	Acceptance criteria	Priority	Release
	Dashboard	USN-5	As a user, I can update my reminders and medicines wherever required		High	Sprint-2
		USN-6	As a user, I can check the application whether the medicine dosage is completed.		Medium	Sprint-2
Customer Care Executive		USN-7	For any troubleshooting, the user can send a mail to the technical team.		Low	
Administrator		USN-8	Ensure smooth functioning and data warehousing strategies		Medium	Sprint-3

6. Project Planning and Scheduling

6.1 Sprint Planning and Estimation

Sprint	Functional Requirement (Epic)	User Story Number	UserStory/Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email or mobile number, password, and confirming my password.	2	High	Rithick .k
Sprint-1	Confirmation E-mail	USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Sibichakravarthi.B
Sprint-1	Authentication	USN-3	As a user, I can register	2	Medium	Sibichakravarthi.B

1			for the application through Gmail			
Sprint-1	Login	USN-4	As a user ,I can login to the application by entering email or mobile number &password	2	High	Paul Mohan. M
Sprint-2	Login	USN-5	As a user ,I can update my reminders and medicines wherever required	1	High	Paul Mohan .M
Sprint-2	Dashboard	USN-6	As a user ,I can check the application whether the medicine dosage is completed	1	Medium	Dhivakaran .M
		USN-7	For any troubleshooting, the user can send a mail to the technical team	1	Low	Dhivakaran.M
Sprint-3		USN-8	Ensures smooth functioning and data Ware housing strategies	1	High	Rithick .k

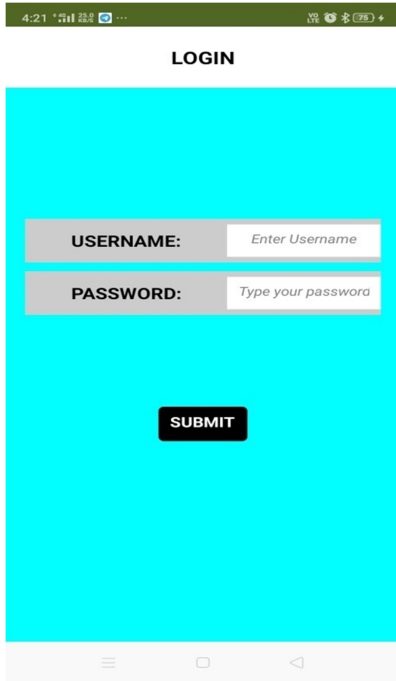
6.2 Sprint Delivery Schedule

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	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	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

7.Coding and Solutioning

7.1 Feature1

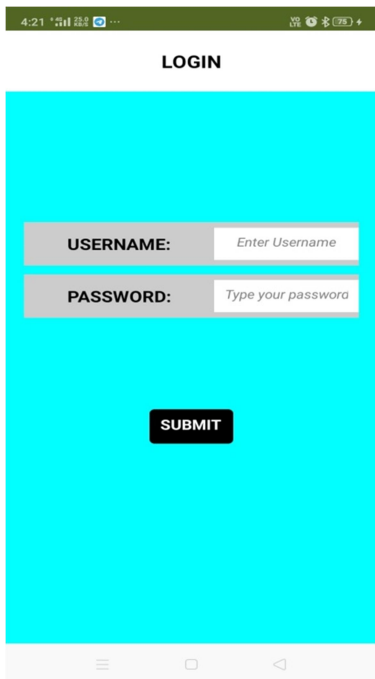
The mobile application develop feature find individual login by different users.



A screenshot of a mobile application interface for a login screen. The screen has a light blue background. At the top, there is a status bar with the time 4:21, signal strength, and battery level. Below the status bar, the word "LOGIN" is centered in bold black text. The main content area contains two input fields: "USERNAME:" with a placeholder "Enter Username" and "PASSWORD:" with a placeholder "Type your password". Both fields have a light gray border. Below the input fields is a black button with the word "SUBMIT" in white capital letters. At the bottom of the screen, there is a white navigation bar with three icons: a hamburger menu, a home button, and a back arrow.

7.2 Feature2

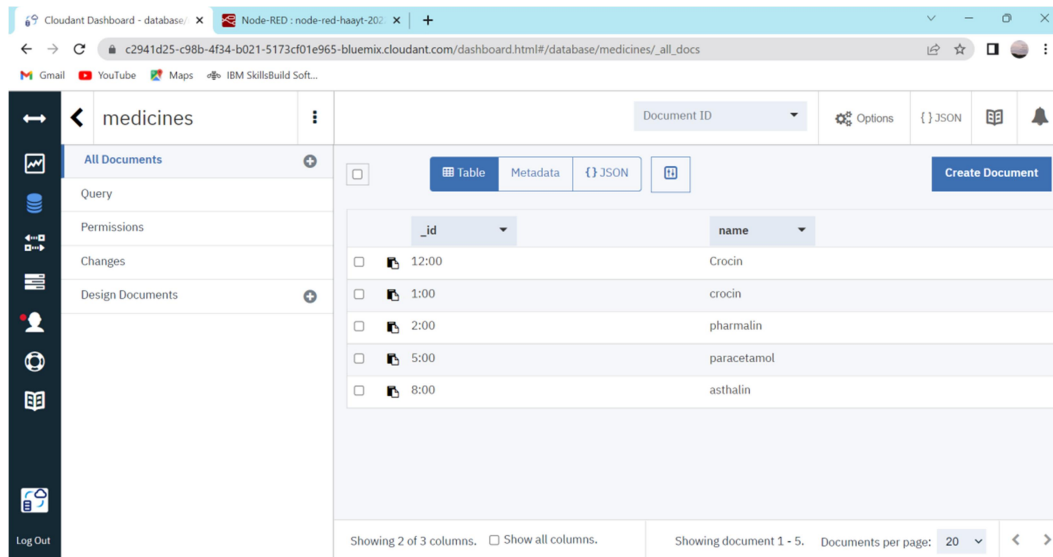
The mobile application also has the feature of uploading medicine names in the cloud.



A screenshot of a mobile application interface for a login screen, identical to the one in Feature 1. The screen has a light blue background. At the top, there is a status bar with the time 4:21, signal strength, and battery level. Below the status bar, the word "LOGIN" is centered in bold black text. The main content area contains two input fields: "USERNAME:" with a placeholder "Enter Username" and "PASSWORD:" with a placeholder "Type your password". Both fields have a light gray border. Below the input fields is a black button with the word "SUBMIT" in white capital letters. At the bottom of the screen, there is a white navigation bar with three icons: a hamburger menu, a home button, and a back arrow.

7.3 Feature 3

The project includes a cloud database system



8. Testing

8.1 Test cases

Testcase	Precondition	Teststeps	Testdata	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: Rithick.K Password: 12345	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: Rithick.K Password: Rithick123	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: Azithromycin Medicine Time: 20.00	Users should be able to update it Successfully .

8.2 User acceptance testing

Medicine Details

Welcome!!!

Please enter the medicine name and time below

Medicine Name:

Medicine Time:

SUBMIT

Logout

1:37 MEDICINES SHOP

APOLLO PHARMACY

NET MEDS

PHARM EASY

TRUE MEDS

1 MG

1:37 Home Page

SET REMAINDER

BUY MEDICINES

EMERGENCY CALL

LOGOUT

4:21 LOGIN

USERNAME:

PASSWORD:

SUBMIT

4:22 Wrong Password

WRONG CREDENTIALS

Go to Login

Medicine Details

Welcome!!!

Please enter the medicine name and time below

Medicine Name:

Medicine Time:

SUBMIT

Logout

9. Results

9.1 Performance Metrics

S.NO	Parameter	Performance
1.	ResponseTime	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 straight forward workflow, which makes the process efficient.
5.	DownTime	Almost no down time due to IBM Cloud enabled solution.

10 .Advantages and Disadvantages

10.1 Advantages

- Help the elderly people to take their medicine at the correct time.
- Avoid personal assistants or caretakers needed for medically sick people.
- Cost efficient.
- Can store multiple data and many notifications can be generated.
- Since it includes voice assistance, even blind people can use our device.

10.2 Disadvantages

- Makes people lethargic and makes them dependent always on others.
- 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 application, numerous data can be fed into the database and notifications can be generated. The mobile application developed is highly customizable by the user and easy to use.

12. FutureScope

The project can be further developed by bringing into the feature of informing the medicine name during the notification. The voice assistance 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>//libraryforwifi
#include<PubSubClient.h>//libraryforMQtt#include
"SoundData.h"
#include"XT_DAC_Audio.h"
XT_Wav_ClassSound("voice_command.wav");XT_
DAC_Audio_ClassDacAudio(2,0);uint32_tDemoCo
unter=0;

voidcallback(char*subscribetopic,byte*payload,unsignedintpayloadLength);

//-----credentials ofIBMAccounts-----

#defineORG"ut4tn5"//IBMORGANITIONID
#defineDEVICE_TYPE"Arduino"//DevicetypementionedinibmwatsonIOTPlatform#define
DEVICE_ID "nitish123"//Device ID mentioned in ibmwatson IOT
Platform#defineTOKEN"123456789"//Token
String
data3;floath,t;

//-----Customisetheabovevalues-----
charserver[]=ORG".messaging.internetofthings.ibmcloud.com";//ServerName
charpublishTopic[]="iot-
2/evt/Data/fmt/json";//topicnameandtypeofeventperformandformatinwhichdatatobesend
charsubscribetopic[]="iot-2/cmd/test/fmt/String";//cmd

REPRESENTcommandtypeAN

DCOMMANDISTESTOFFORMATSTRING
charauthMethod[]="use-token-
auth";//authenticationmethodchartoken[]=TOKEN;
```

```

char clientId[]="d:"ORG":"DEVICE_TYPE":"DEVICE_ID;/ /clientId

// .....
WiFiClient wifiClient; // creating the instance for wifi client
PubSubClient client(server, 1883, callback, wifiClient); // calling the predefined clientId by passing parameter like server id, port and wifi credential
void setup() // configuring the ESP32
{
    Serial.begin(115200);

    delay(10); Serial.
    println(); wifi con
    nect(); mqtt conn
    ect();
}

void loop() // Recursive Function
{

    delay(1000);
    if (!client.loop())
    { mqtt connect();
    }
}

/* ..... 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();
}
}
voidwificonnect();//functiondefinationforwificonnect
{
    Serial.println();Serial.print("Connectingto");

    WiFi.begin("Wokwi-GUEST","",6);//passingthewificredentialstoestablishtheconnection
    while(WiFi.status()!=WL_CONNECTED){delay(500);
        Serial.print(".");
    }
    Serial.println("");Serial.println("Wificonnected");Serial.println("IPaddress:");
    Serial.println(WiFi.localIP());
}

voidinitManagedDevice(){
    if (client.subscribe(subscribetopic))
        {Serial.println((subscribetopic));Serial.println("subscribetocmdOK");
        }else{
            Serial.println("subscribetocmdFAILED");
        }
}

voidcallback(char*subscribetopic,byte*payload,unsignedintpayloadLength)
{
    Serial.print("callbackinvokedfortopic:");Serial.println(subscribetopic);
}

```

```

for(int i=0;i<payloadLength;i++){
    //Serial.print((char)payload[i]);data3+=
    (char)payload[i];
}

Serial.println("data: "+
data3);if(data3=="announce")
{
    Serial.println(data3);for(int
i=0;i<5;i++){DacAudio.Fill
Buffer();if(Sound.Playing==
false)
    DacAudio.Play(&Sound);Serial.println(DemoCo
unter++);
}
}

else
{
    pass;
}
data3="";

}

```

Github link: <https://github.com/IBM-EPBL/IBM-Project-7805-1664354180>

Projectdemo link: https://drive.google.com/drive/folders/1V3v66xJNdqL_iKuplQ8mFJaWApDMPgP-?usp=share_link