PersonalAssistance forSeniorsWhoAreSelf-Reliant - Project Report

1. Introduction

1.1Project 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.

1.2Purpose

- 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

2.1Existingproblem

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

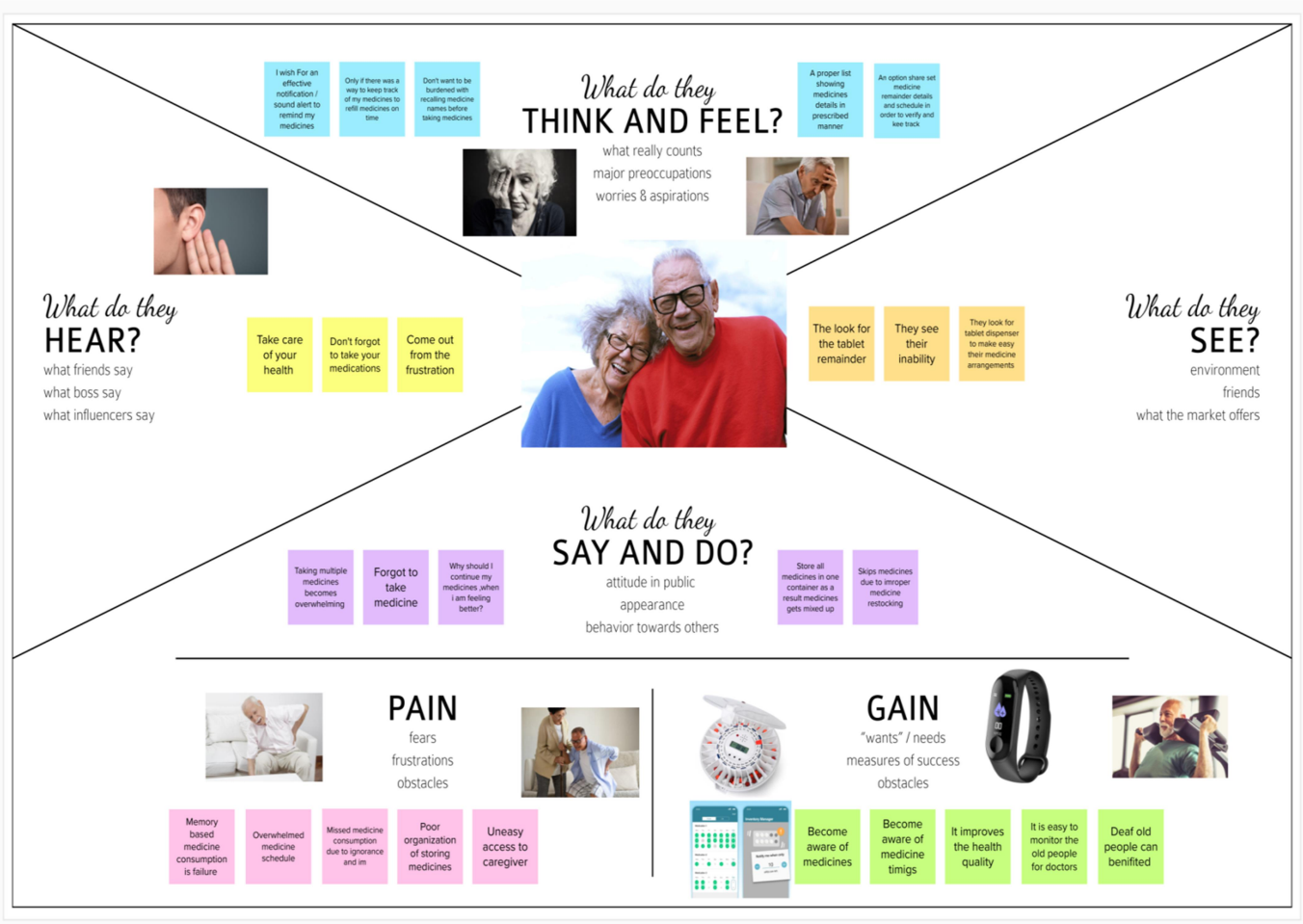
1) Visual Health Reminder: A Reminder for Medication Intake and Measuring BloodPressure to Support Elderly People ; René Baranyi; Sascha Rainer; Stefan Schlossarek; NadjaLederer; Thomas Grechenig
2) Cloud Computing based Medical Assistance & Pill Reminder ; A. Chinnasamy; Ram Prasad J; Syed Rafeeq Ahmed;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

2.3 Problem statement definition

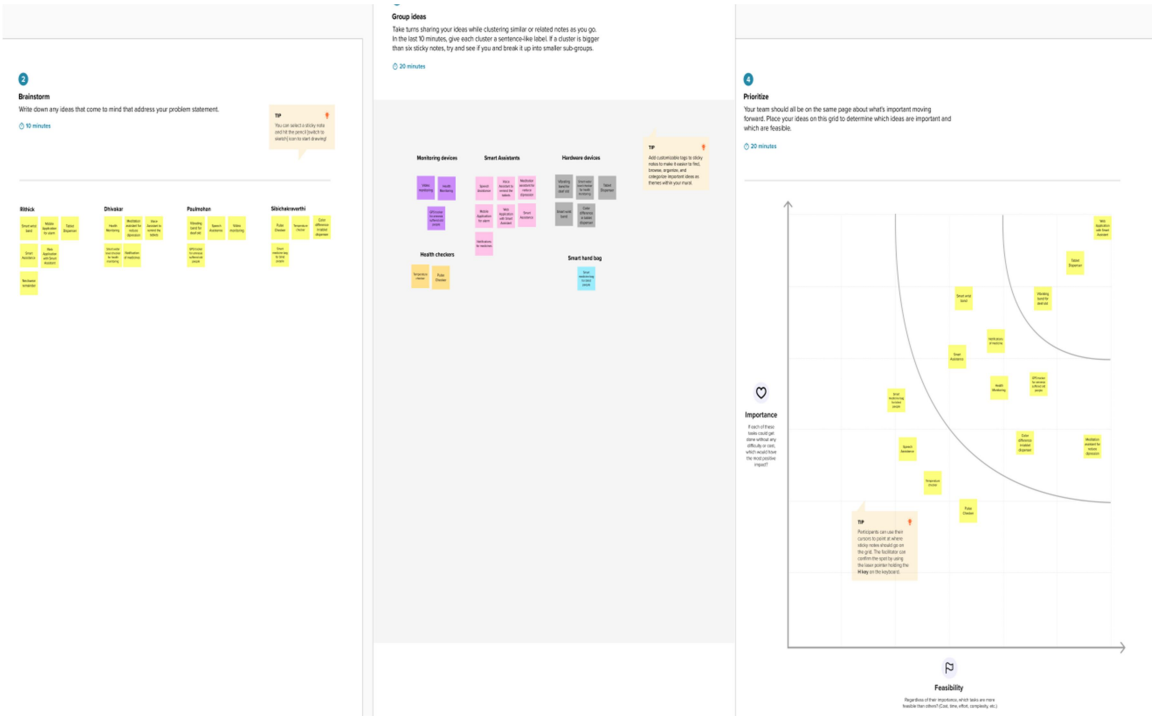
Skipping medicines can be serious for some medical health conditions; Sometimes elderly people forget to take their medicine at the correct time. They also forget which medicine one should take at that particular time. And it is difficult for doctors/caretakers to monitor the patients around the clock.

3. Ideation and proposed solution

3.1 Empathy Map Canvas



3.2IdeationandBrainstorming



3.3 Proposed solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	➢ 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	➢ 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 CS

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

6. CUSTOMER CONSTRAINTS CC

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

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 .

7. BEHAVIOUR

BE

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

Identify strong TR & EM

3. TRIGGERS

TR

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:

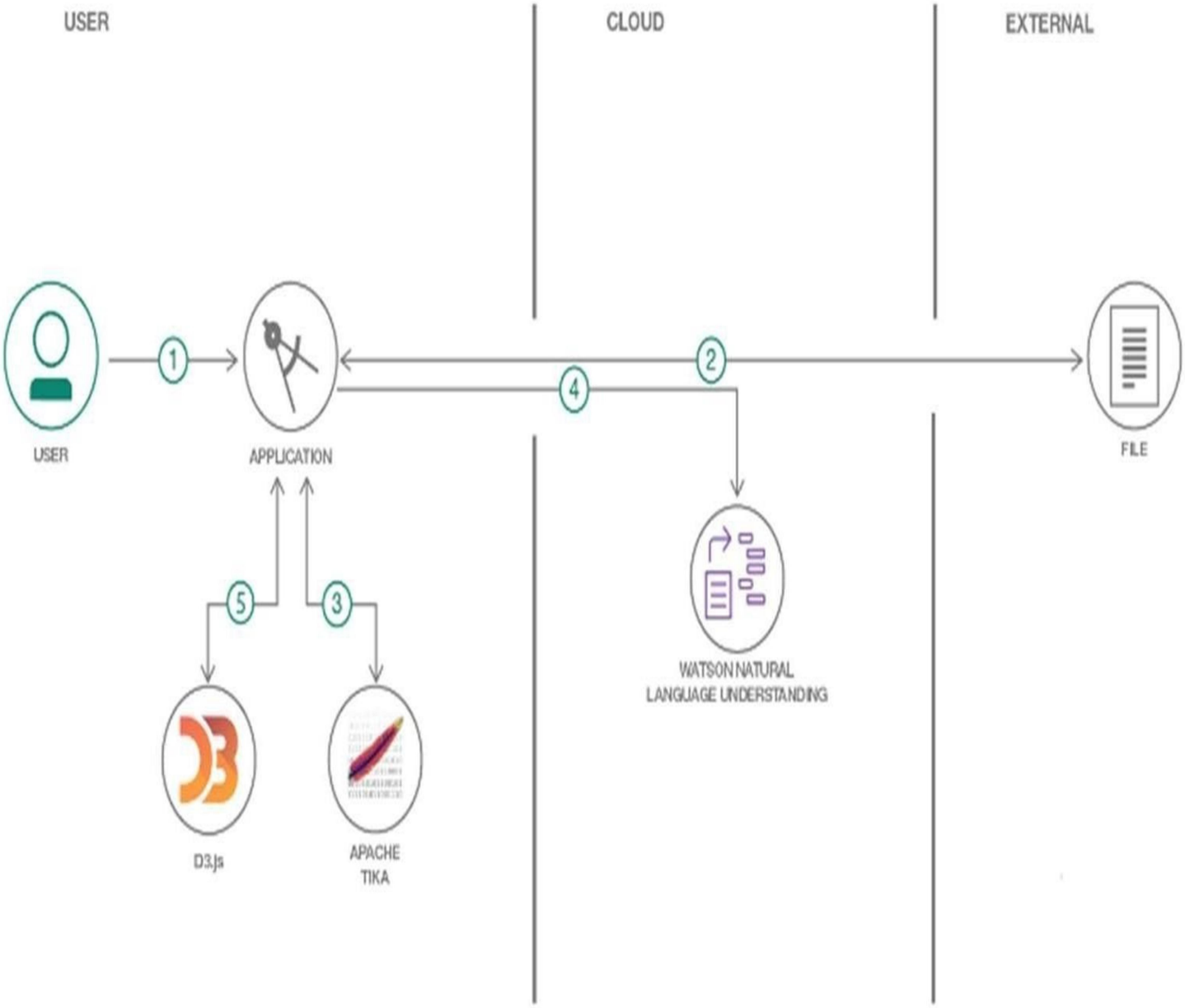
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	**User Registration**	Registration through Gmail Registration by phone number
FR-2	**User Confirmation**	Confirmation via Email Confirmation through SMS/Messages
FR-3	**User Login (Web)**	Login with registered mail id and password
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:

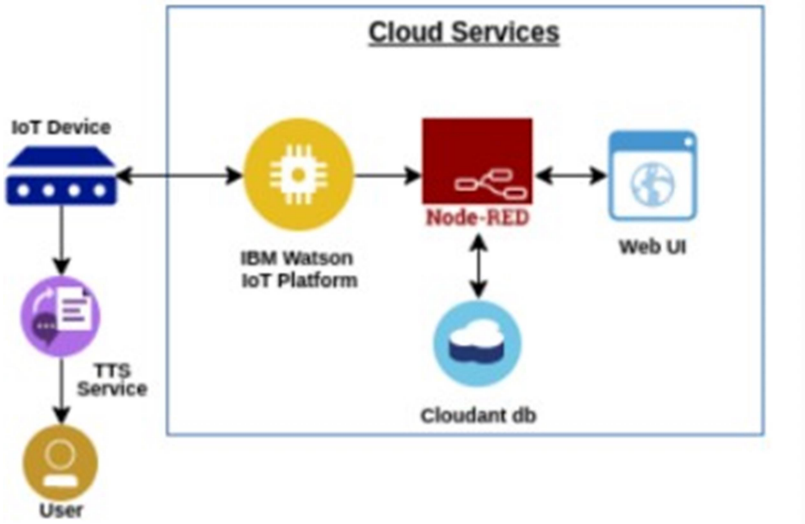
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	➢ The system should be user-friendly for the users. It is used to remind the medicine names. ➢ It alerts the users through voice commands.
NFR-2	**Security**	➢ The login information should not be accessed by any other users than the respective user. ➢ The data of the users should be kept confidential.
NFR-3	**Reliability**	➢ It reminds on correct time. ➢ The user data should be updated and examined after certain period of time.
NFR-4	**Performance**	➢ The voice message will be delivered accurately to the given time. ➢ It works without any connection interruption
NFR-5	**Availability**	➢ 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**	➢ 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

UserType	Functional Requirement (Epic)	User Story Number	UserStory/Task	Acceptance criteria	Priority	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		Medium	Sprint-1
	Login	USN-4	As a user, I can log intothe application byentering email or mobilenumber&password	I canaccess myaccount /dashboard	High	Sprint-1

User Type	Functional Requirement (Epic)	User story Number	UserStory/Task	Acceptance criteria	Priority	Release
	Dashboard	USN-5	Asauser,Icanupdatemy reminders andmedicines whereverrequired		High	Sprint-2
		USN-6	Asauser,Icancheckthe application whether themedicine dosage iscompleted.		Medium	Sprint-2
Customer Care Executive		USN-7	Foranytroubleshooting, the user can send a mailtothetechnicalteam.		Low	
Administaror		USN-8	Ensuressmooth functioning and datawarehousingstrategies		Medium	Sprint-3

6.ProjectPlanningand Scheduling

6.1 Sprint Planning and Estimation

Sprint	Functional Requirement(Epic)	UserStoryNumber	UserStory/Task	Story Points	Priority	TeamMembers
Sprint-1	Registrartion	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	Mediu m	Dhivakaran .M
		USN-7	For any troubleshooting, the user can send a mail to the technical team	1	Low	Dhivakara n.M
Sprint-3		USN-8	Ensures smooth functioning and data Ware housing strategies	1	High	Rithick .k

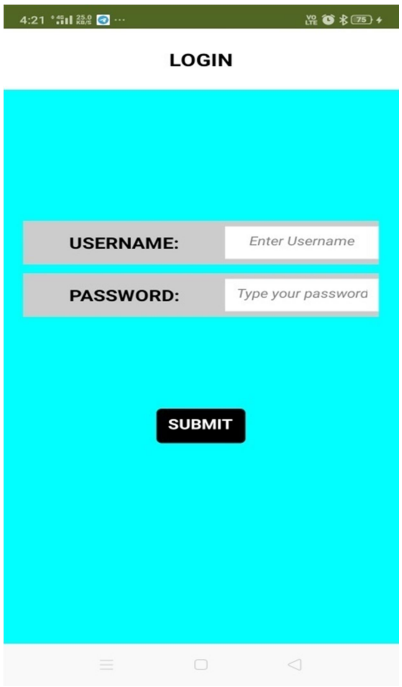
6.2 Sprint Delivery Schedule

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

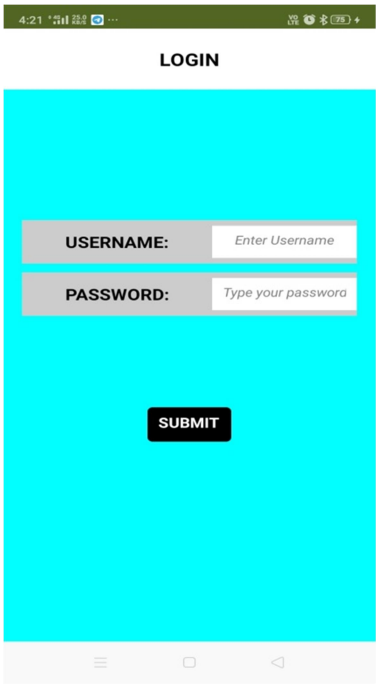
7.1 Feature1

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



7.2 Feature2

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



7.3. Feature 3

The project includes a cloud database system

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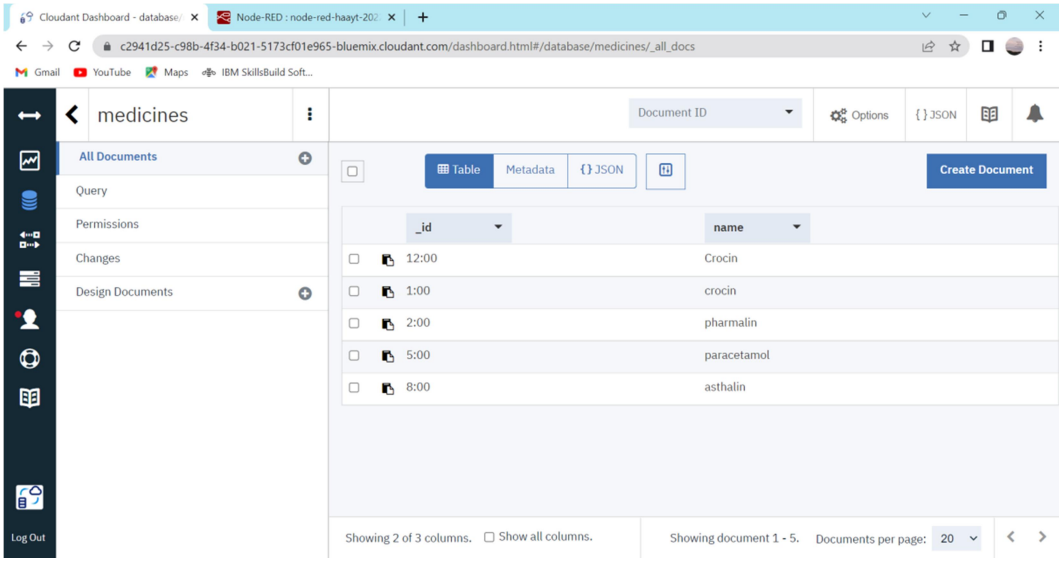


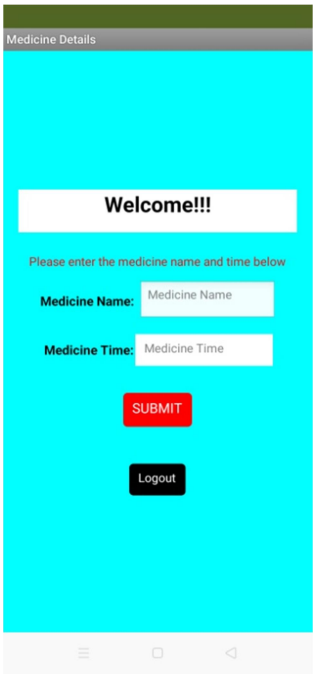
8.Testing

8.1Test cases

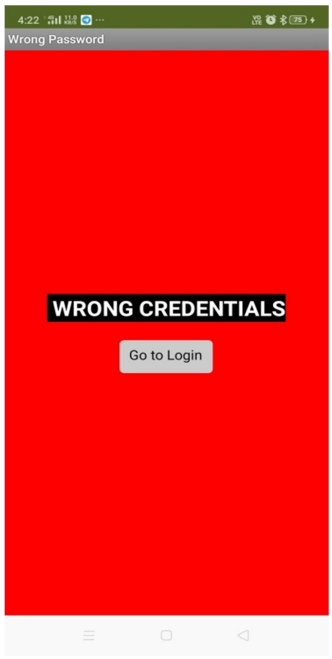
Testcase	Precondition	Teststeps	Testdata	Expectedr esult
Verify login with valid credentials	User should have a network connection	1. Launch URL 2. Enter valid username. 3. Enter valid password. 4. Click on the “Login” button.	Username: Rithick.K Password: 12345	Users should be able to login Successfully .
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 .

8.2User acceptance testing

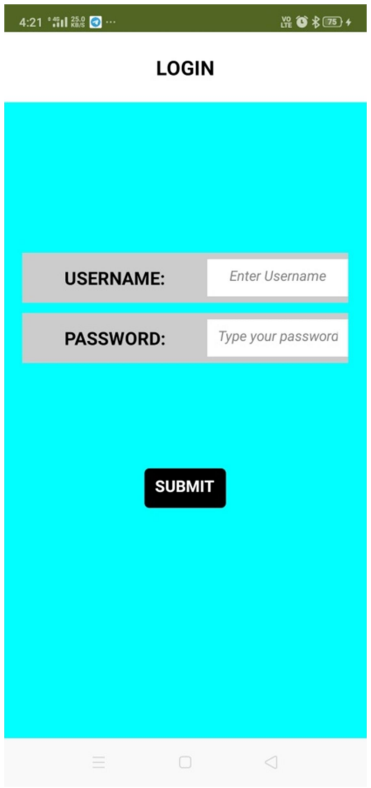
Login page testing



Incorrect login attempt



Medicine page testing



9. Results

9.1PerformanceMetrics

S.NO	Parameter	Performance
1.	ResponseTime	0.2s (Average of 10trials)
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 enabledsolution.

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 whichreminds them of the medicines to be consumed at the particular time. Skipping tablets maylead to serious problems if the person has a severe illness and this can be avoided. Since thecloud is integrated with the mobile application, numerous data can be fed into the databaseand 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;
```

```
charclientId[]="d:"ORG":"DEVICE_TYPE":"DEVICE_ID;/ /clientid


//------------------------------------------------------------------
WiFiClientwifiClient;//creatingtheinstanceforwificlient
PubSubClientclient(server,1883,callback,wifiClient);//callingthepredefinedclientidbypassingparameterlikes
erverid,portandwificredential
voidsetup()//configureingtheESP32
{
  Serial.begin(115200);

  delay(10);Serial.
  println();wificon
  nect();mqttconn
  ect();
}

voidloop()//RecursiveFunction
{




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




/*.....retrievingtoCloud..... */


voidmqttconnect(){
  if (!client.connected())
    {Serial.print("Reconnecting client to
    ");Serial.println(server);
    while(!!!client.connect(clientId,authMethod,token)){
```

```
      Serial.print(".");d
      elay(500);
    }

     initManagedDevice();Serial.printl
     n();
  }
}
voidwificonnect()//functiondefinationforwificonnect
{
  Serial.println();Serial.print("Connec
  tingto");

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

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

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

  Serial.print("callbackinvokedfortopic:");Serial.prin
  tln(subscribetopic);
```

```
  for(inti=0;i<payloadLength;i++){
    //Serial.print((char)payload[i]);dat
    a3+=(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
Projectdemolink: https://drive.google.com/drive/folders/1V3v66xJNdqL_iKuplQ8mFJaWApDMPgP-?usp=share_link