Personal Assistance for Seniors who are Self-Reliant

A PROJECT REPORT

Submitted By

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in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

JANSONS INSTITUTE OF TECHNOLOGY, COIMBATORE

ANNA UNIVERSITY: CHENNAI 600 025

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

2.2. REFERENCES

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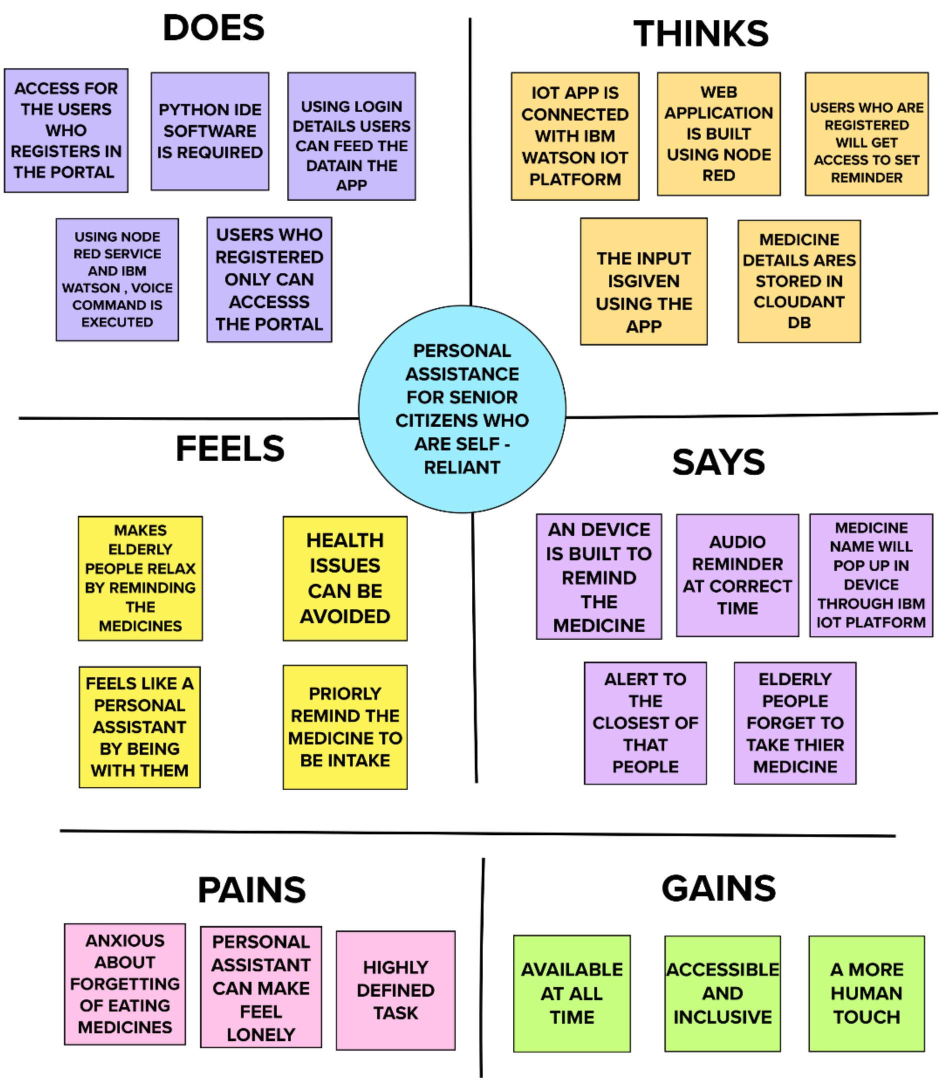
2.3. PROBLEM STATEMENT DEFINITION

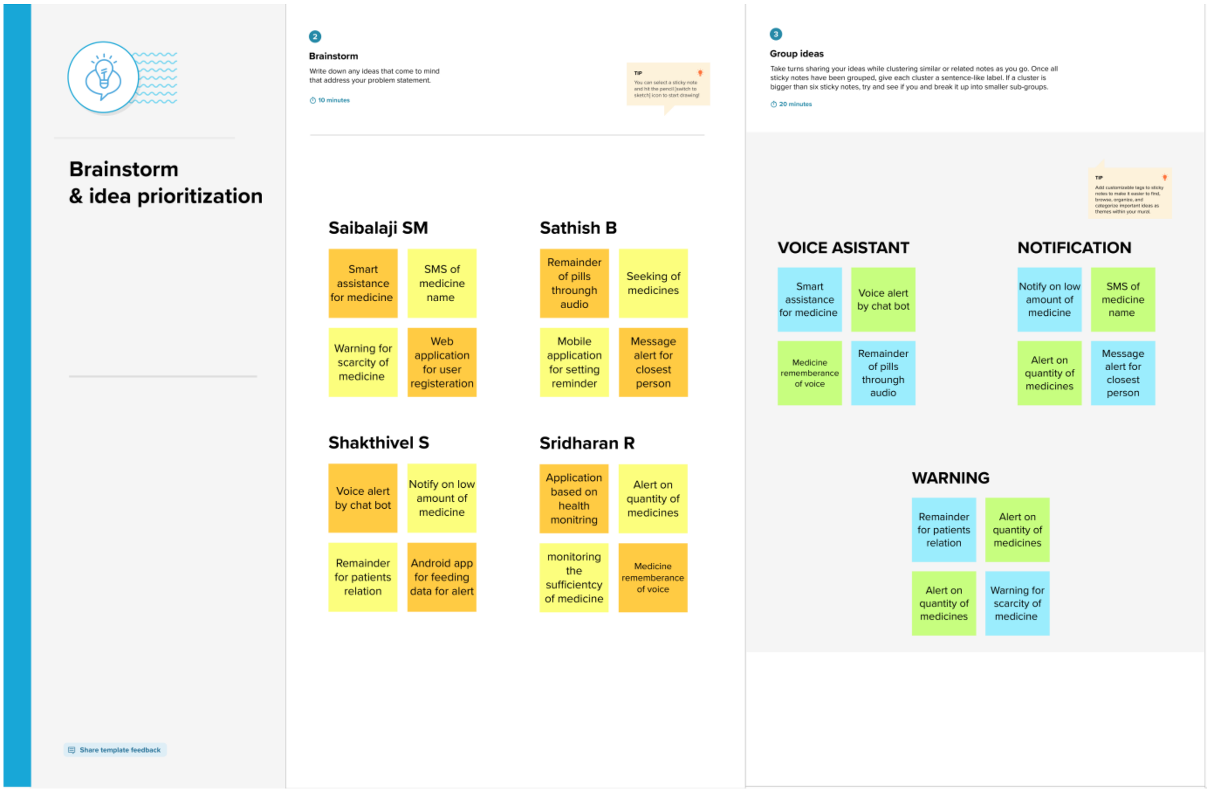
It is very difficult for the senior citizens (elder people) to remember their medicines. To avoid the skipping up the medicines,they can be remembered by using the voice commands of the medicine names at correct time specified. If the voice commands on the medicine name is not available, they are given the reminder of the medicine by SMS on their phone or to their closest person.

3. IDEATION & PROPOSED SOLUTION

3.1. EMPATHY MAP CANVAS


DOES
ACCESS FOR THE USERS WHO REGISTERS IN THE PORTAL
PYTHON IDE SOFTWARE IS REQUIRED
USING LOGIN DETAILS USERS CAN FEED THE DATAIN THE APP
USING NODE RED SERVICE AND IBM WATSON , VOICE COMMAND IS EXECUTED
USERS WHO REGISTERED ONLY CAN ACCESSS THE PORTAL
THINKS
IOT APP IS CONNECTED WITH IBM WATSON IOT PLATFORM
WEB APPLICATION IS BUILT USING NODE RED
USERS WHO ARE REGISTERED WILL GET ACCESS TO SET REMINDER
THE INPUT ISGIVEN USING THE APP
MEDICINE DETAILS ARES STORED IN CLOUDANT DB
PERSONAL ASSISTANCE FOR SENIOR CITIZENS WHO ARE SELF - RELIANT
FEELS
MAKES ELDERLY PEOPLE RELAX BY REMINDING THE MEDICINES
HEALTH ISSUES CAN BE AVOIDED
FEELS LIKE A PERSONAL ASSISTANT BY BEING WITH THEM
PRIORLY REMIND THE MEDICINE TO BE INTAKE
SAYS
AN DEVICE IS BUILT TO REMIND THE MEDICINE
AUDIO REMINDER AT CORRECT TIME
MEDICINE NAME WILL POP UP IN DEVICE THROUGH IBM IOT PLATFORM
ALERT TO THE CLOSEST OF THAT PEOPLE
ELDERLY PEOPLE FORGET TO TAKE THIER MEDICINE
PAINS
ANXIOUS ABOUT FORGETTING OF EATING MEDICINES
PERSONAL ASSISTANT CAN MAKE FEEL LONELY
HIGHLY DEFINED TASK
GAINS
AVAILABLE AT ALL TIME
ACCESSIBLE AND INCLUSIVE
A MORE HUMAN TOUCH

3.2. IDEATION AND BRAINSTORMING



Brainstorm
& idea prioritization

Share template feedback

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!

Saibalaji SM

- Smart assistance for medicine
- SMS of medicine name
- Warning for scarcity of medicine
- Web application for user registeration

Sathish B

- Remainder of pills through audio
- Seeking of medicines
- Mobile application for setting reminder
- Message alert for closest person

Shakthivel S

- Voice alert by chat bot
- Notify on low amount of medicine
- Remainder for patients relation
- Android app for feeding data for alert

Sridharan R

- Application based on health monitring
- Alert on quantity of medicines
- monitoring the sufficientcy of medicine
- Medicine rememberance of voice

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 and break it up into smaller sub-groups.

20 minutes

TIP

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

VOICE ASISTANT

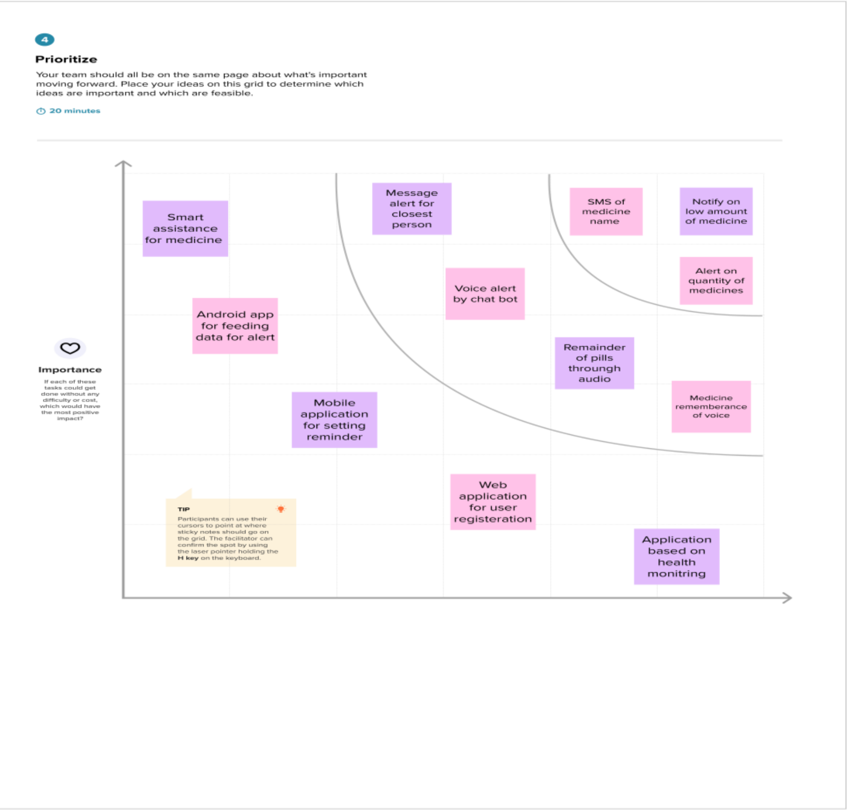
- Smart assistance for medicine
- Voice alert by chat bot
- Medicine rememberance of voice
- Remainder of pills through audio

NOTIFICATION

- Notify on low amount of medicine
- SMS of medicine name
- Alert on quantity of medicines
- Message alert for closest person

WARNING

- Remainder for patients relation
- Alert on quantity of medicines
- Alert on quantity of medicines
- Warning for scarcity of medicine



4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

Importance

If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.

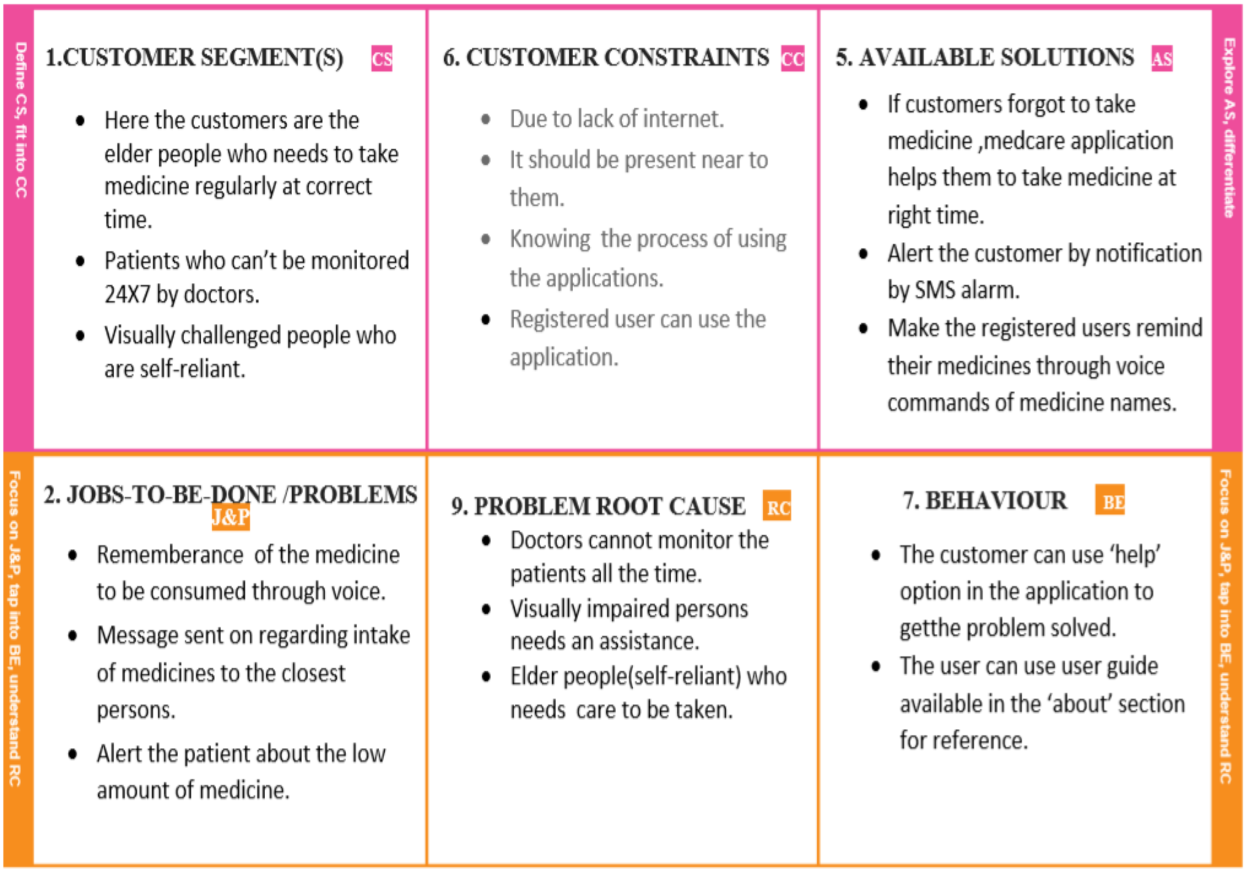
Smart assistance for medicine
Message alert for closest person
SMS of medicine name
Notify on low amount of medicine
Voice alert by chat bot
Alert on quantity of medicines
Android app for feeding data for alert
Remainder of pills throungh audio
Medicine rememberance of voice
Mobile application for setting reminder
Web application for user registeration
Application based on health monitring

3.3. PROPOSED SOLUTION

S.No	Parameter	Description
1	Problem Statement (Problem to be solved)	Senior citizens who are in need of medicine reminder and self-assistance because they don't want to skip their intake of medicine
2	Idea / Solution description	Creation of the web application which remind the medicine name and time through a voice alert
3	Novelty / Uniqueness	Blind people can get to know their time of taking pills
4	Social Impact / Customer Satisfaction	The users are satisfied with the proper reminder and intake of pills
5	Business Model (Revenue Model)	By our web application the revenue can be made in the form of popping up of advertisements or by

		overlaying add from third party services
6	Scalability of the Solution	Vast number of people who are aged can be provided with portable devices to ensure their health conditions by consuming medicines at correct time using web application

3.4. PROBLEM SOLUTION FIT



Define CS, fit into CC
Explore AS, differentiate
Focus on J&P, tap into BE, understand RC
Focus on J&P, tap into BE, understand RC

1.CUSTOMER SEGMENT(S) CS

- Here the customers are the elder people who needs to take medicine regularly at correct time.
- Patients who can't be monitored 24X7 by doctors.
- Visually challenged people who are self-reliant.

6. CUSTOMER CONSTRAINTS CC

- Due to lack of internet.
- It should be present near to them.
- Knowing the process of using the applications.
- Registered user can use the application.

5. AVAILABLE SOLUTIONS AS

- If customers forgot to take medicine ,medcare application helps them to take medicine at right time.
- Alert the customer by notification by SMS alarm.
- Make the registered users remind their medicines through voice commands of medicine names.

2. JOBS-TO-BE-DONE /PROBLEMS J&P

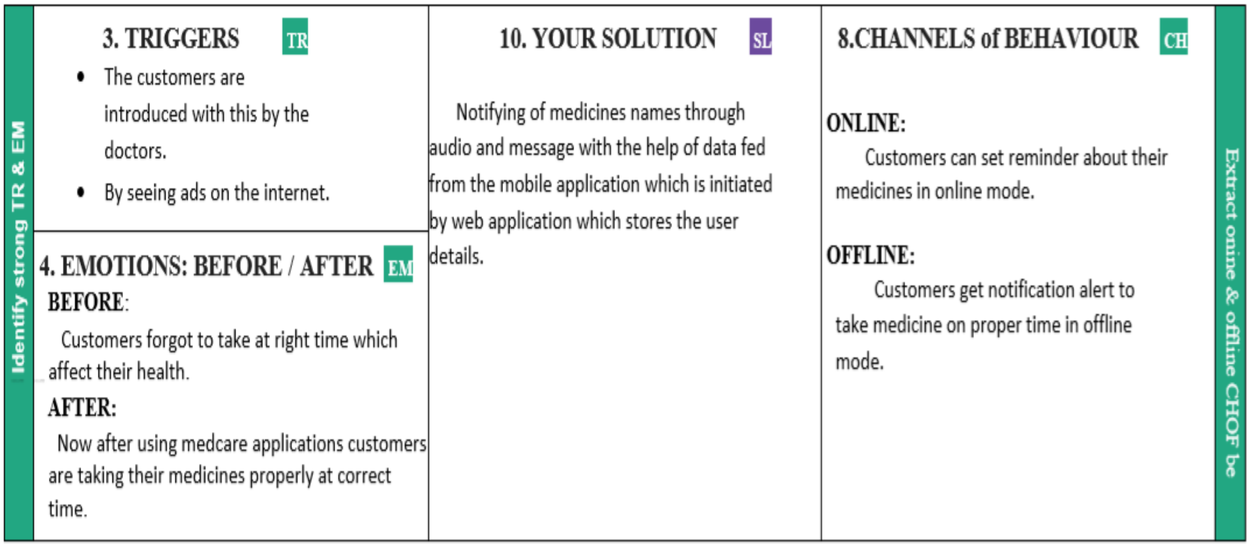
- Rememberance of the medicine to be consumed through voice.
- Message sent on regarding intake of medicines to the closest persons.
- Alert the patient about the low amount of medicine.

9. PROBLEM ROOT CAUSE RC

- Doctors cannot monitor the patients all the time.
- Visually impaired persons needs an assistance.
- Elder people(self-reliant) who needs care to be taken.

7. BEHAVIOUR BE

- The customer can use 'help' option in the application to getthe problem solved.
- The user can use user guide available in the 'about' section for reference.



Identify strong TR & EM

3. TRIGGERS TR

- The customers are introduced with this by the doctors.
- By seeing ads on the internet.

4. EMOTIONS: BEFORE / AFTER EM

BEFORE:

Customers forgot to take at right time which affect their health.

AFTER:

Now after using medcare applications customers are taking their medicines properly at correct time.

10. YOUR SOLUTION SL

Notifying of medicines names through audio and message with the help of data fed from the mobile application which is initiated by web application which stores the user details.

8.CHANNELS of BEHAVIOUR CH

ONLINE:

Customers can set reminder about their medicines in online mode.

OFFLINE:

Customers get notification alert to take medicine on proper time in offline mode.

Extract onine & offline CHOF be

4. REQUIREMENT ANALYSIS

4.1. FUNCTIONAL REQUIREMENTS

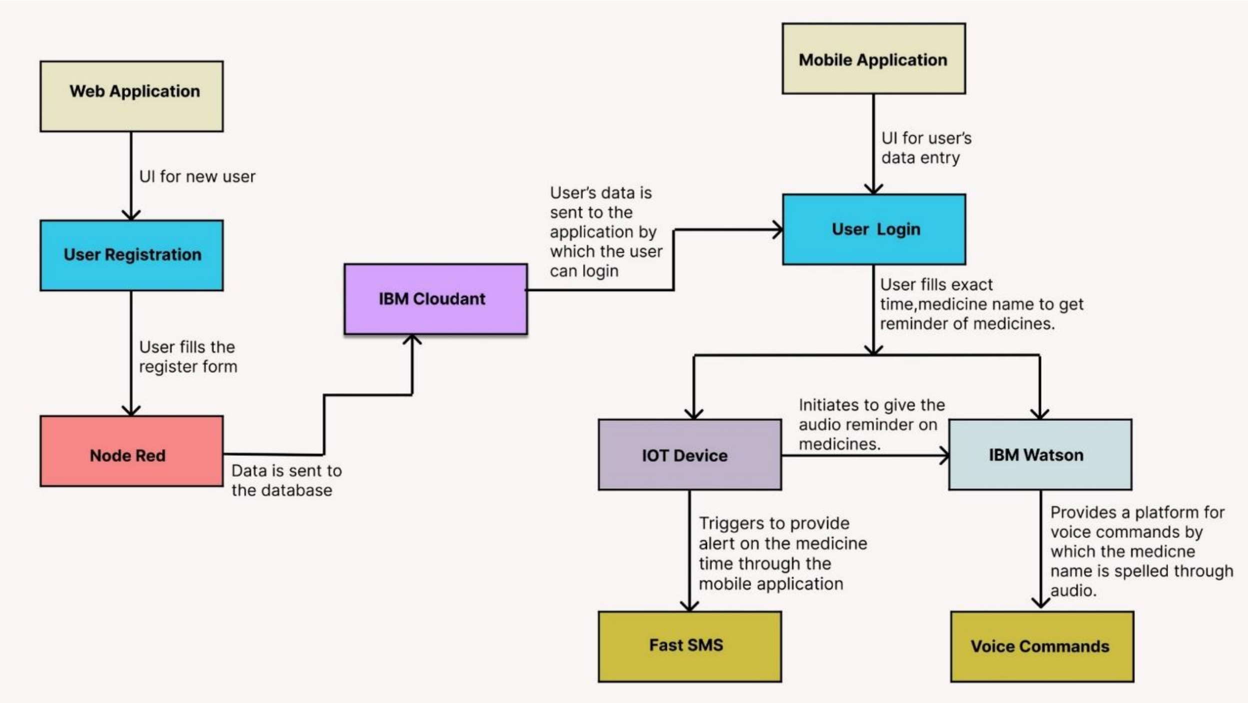
FR No.	**Functional Requirement (Epic)**	**Sub Requirement (Story / Sub-Task)**
FR-1	User Registration	Registration through Gmail Registration by phone number
FR-2	User Confirmation	Confirmation via Email Confirmation through SMS/Messages
FR-3	User Login (Web)	Login with registered mail id and password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

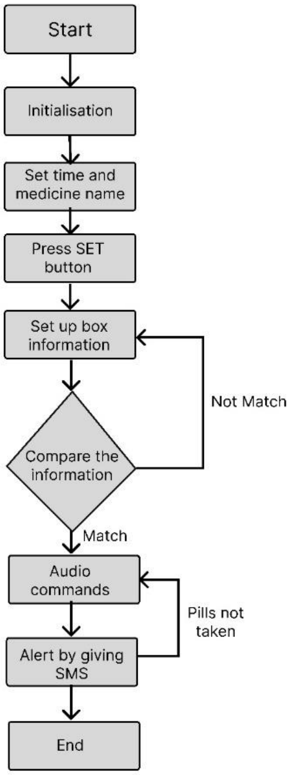
4.2. NON-FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The system should be user-friendly for the users. It is used to remaind the medicine names. It alerts the users through voice commands.
NFR-2	**Security**	The login information should not be accessed by anyother users than the respective. The data of the users should be kept confidential.
NFR-3	**Reliability**	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**	It is easily adaptable The device is compatible and portable The application can handle any number of registration.

5.PROJECT DESIGN

5.1. DATA FLOW DIAGRAMS


Web Application
UI for new user
User Registration
User fills the register form
Node Red
Data is sent to the database
IBM Cloudant
User's data is sent to the application by which the user can login
Mobile Application
UI for user's data entry
User Login
User fills exact time,medicine name to get reminder of medicines.
IOT Device
Initiates to give the audio reminder on medicines.
IBM Watson
Triggers to provide alert on the medicine time through the mobile application
Fast SMS
Provides a platform for voice commands by which the medicne name is spelled through audio.
Voice Commands



5.2. SOLUTION & TECHNICAL ARCHITECTURE

IOT Device:

- Getting the information from the application about the time and name of the medicines.
- Sending an SMS to the persons.
- Gathering the user information from the web application in which the user registers.

To accomplish this, we have to complete all the activities listed below:

Create and Configure IBM Cloud Services:

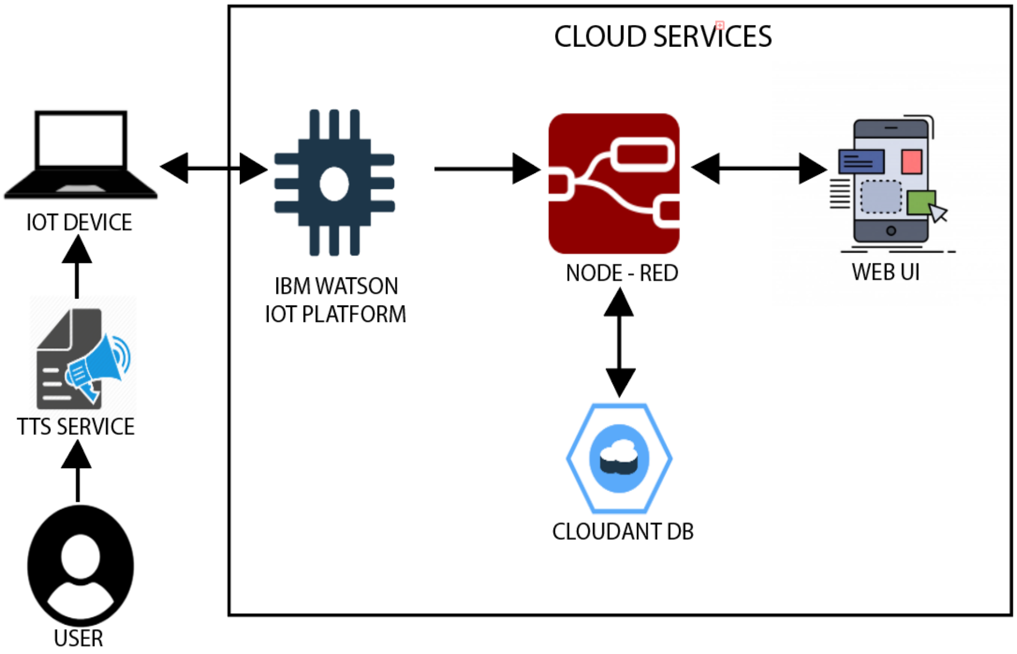
- Create IBM Watson IOT platform
- Create a device & configure the IBM IOT Platform
- Create Node-Red service
- Create a database in IBM Cloudant DB to medicine names and time.

Develop a web application using Node-RED service:

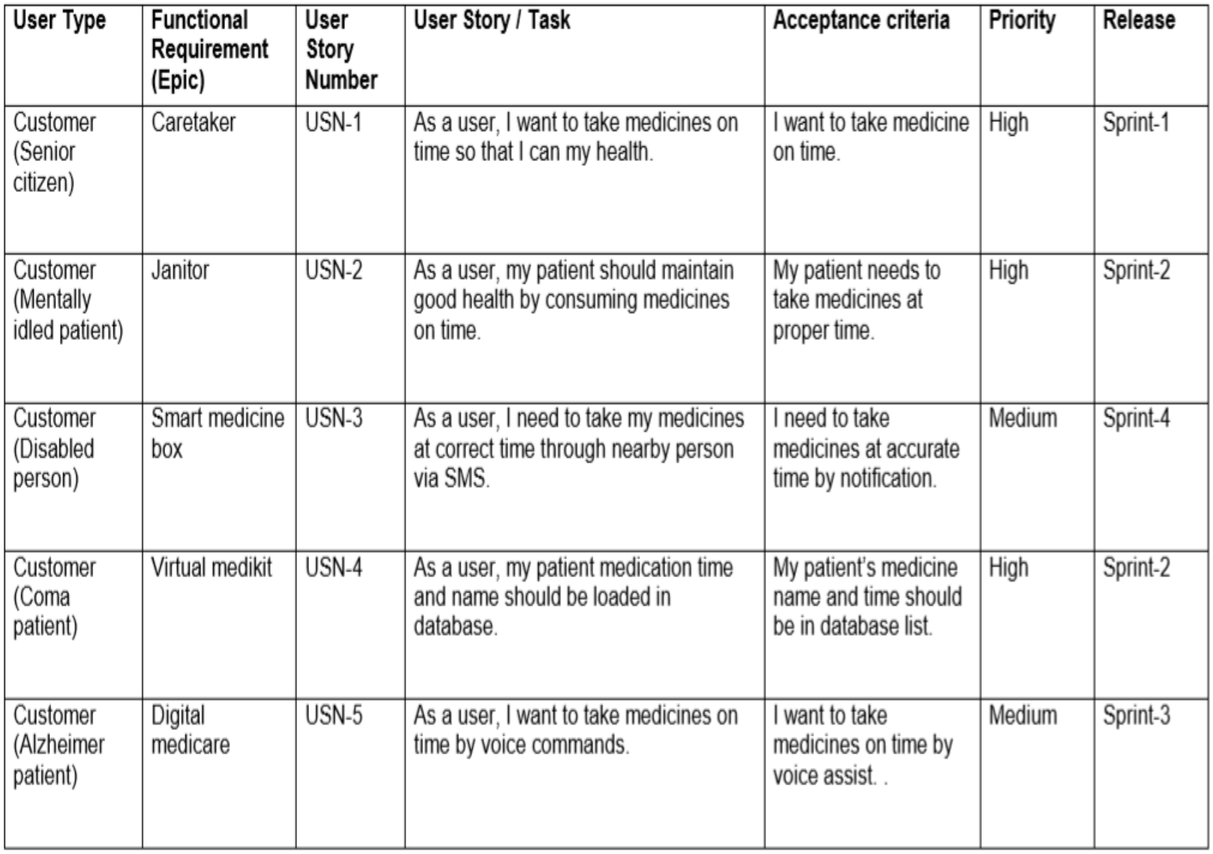
- Develop the web application using Node-RED.
- Develop a python script to publish the medicine names and time to remind details to the IBM IOT Platform.

Develop an application:

- Develop an application in which the user can feed the data on the medicine name and time.
- Develop an application which can transmit the signal on the reminder of the medicines at the time specified.



5.3. USER STORIES



User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Senior citizen)	Caretaker	USN-1	As a user, I want to take medicines on time so that I can my health.	I want to take medicine on time.	High	Sprint-1
Customer (Mentally idled patient)	Janitor	USN-2	As a user, my patient should maintain good health by consuming medicines on time.	My patient needs to take medicines at proper time.	High	Sprint-2
Customer (Disabled person)	Smart medicine box	USN-3	As a user, I need to take my medicines at correct time through nearby person via SMS.	I need to take medicines at accurate time by notification.	Medium	Sprint-4
Customer (Coma patient)	Virtual medikit	USN-4	As a user, my patient medication time and name should be loaded in database.	My patient's medicine name and time should be in database list.	High	Sprint-2
Customer (Alzheimer patient)	Digital medicare	USN-5	As a user, I want to take medicines on time by voice commands.	I want to take medicines on time by voice assist. .	Medium	Sprint-3

6. PROJECT PLANNING & SCHEDULING

6.1. SPRINT PLANNING & ESTIMATION

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Login	USN-1	As a admin, I can log into the application by entering username & password	5	Medium	Sathish B
Sprint-1		USN-2	When the admin doesn’t enter the username it displays an error message group	3	Medium	Sathish B
Sprint-1		USN-3	When the admin doesn’t enter the password it displays an error message popup	4	Medium	Sathish B
Sprint-1		USN-4	When the admin enters the invalid credentials it displays an error popup	5	Medium	Shakthivel S

Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint-1		USN-5	When the admin enter the correct username and password it redirects to the dashboard	3	High	Shakthivel S
Sprint-2	Dashboard	USN-1	Creating a Node-Red dashboard	5	Medium	Saibalaji SM
Sprint-2		USN-2	Devoloping a Node-Red to publish data to IBM cloud	8	High	Saibalaji SM
Sprint-2		USN-3	Create a register form in Node-Red	7	Medium	Saibalaji SM
Sprint-3	Creating device	USN-1	Creating a device in IBM Watson IOT platform	10	High	Shakthivel S
Sprint-3	Python	USN-2	Connect the device created in wokwi to the device created in IBM Watson IOT platform.	10	High	Saibalaji SM
Sprint-4	MIT app inventor	USN-1	Create a Interface for login page and Dashboard	5	Low	Sridharan R

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-4		USN-2	Connect MIT app to Node Red	5	High	Sridharan R
Sprint-4		USN-3	As a user, I can keep track of the medicine time	6	Medium	Sridharan R
Sprint-4	Alert	USN-4	Retrieving the time from cloudant and alert the user through voice command	4	High	Sridharan R

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	4 Days	31 Oct 2022	3 Nov 2022	20	2 Nov 2022
Sprint-2	20	5 Days	04 Nov2022	8 Nov 2022	20	8 Nov 2022
Sprint-3	20	5 Days	09 Nov 2022	13 Nov 2022	20	12 Nov 2022
Sprint-4	20	4 Days	14 Nov 2022	17 Nov 2022	20	18 Nov 2022

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let’s calculate the team’s average velocity (AV) per iteration unit (story points per day)

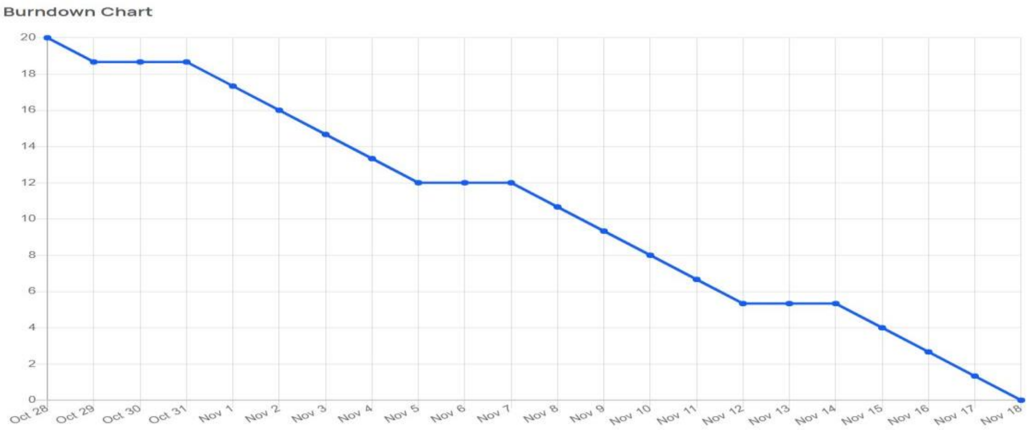
AV = Sprint duration / Velocity
= 20 / 18
AV= 1.11

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

https://www.visual-paradigm.com/scrum/scrum-burndown-chart/

https://www.atlassian.com/agile/tutorials/burndown-charts



6.3. REPORTS FROM JIRA

PAFSWASR-1:

[PAFSWASR-1] ***Login page*** *Created: 13/Nov/22 Updated: 13/Nov/22 Resolved: 13/Nov/22*			
Status:	Done		
Project:	Personal assistance for seniors wo are self-reliant		
Components:	HTML,CSS,Javascript		
Affects versions:	5.0		
Fix versions:	5.0		
Type:	Task	**Priority:**	Medium
Reporter:	Saibalaji Sm	**Assignee:**	shakthivel2308
Resolution:	Done	**Votes:**	0
Labels:	None		
Remaining Estimate:	3 hours		
Time Spent:	21 hours		

Original estimate:	1 days
Rank:	1
Sprint:	Sprint 1

Generated at Sun Nov 13 14:17:39 UTC 2022 by Saibalaji Sm using Jira 1001.0.0-SNAPSHOT#100210-sha1:583150f45e96fe66b2cb2898eb1e9ae5719d8732.

PAFSWASR-2:

[PAFSWASR-2] create a node red dashboard *Created: 13/Nov/22 Updated: 13/Nov/22 Resolved: 13/Nov/22*			
Status:	Done		
Project:	Personal assistance for seniors wo are self-reliant		
Type:	Task	**Priority:**	Medium
Reporter:	Saibalaji Sm	**Assignee:**	Saibalaji Sm
Resolution:	Done	**Votes:**	0
Labels:	None		
Remaining Estimate:	5 hours		
Time Spent:	28 hours		

Original estimate:	2 days
Rank:	2
Sprint:	Sprint 2

Generated at Sun Nov 13 15:53:00 UTC 2022 by Saibalaji Sm using Jira 1001.0.0-SNAPSHOT#100210-sha1:583150f45e96fe66b2cb2898eb1e9ae5719d8732.

PAFSWASR-3:

*[PAFSWASR-3] **Create an app in MIT App Inventor for entering the details*** *Created: 18/Nov/22 Updated: 18/Nov/22*

Status:	Done		
Project:	Personal assistance for seniors wo are self-reliant		
Components:	MIT App Inventor		
Affects versions:	None		
Fix versions:	None		
Type:	Task	**Priority:**	Medium
Reporter:	Saibalaji Sm	**Assignee:**	Sridharan R
Resolution:	Done	**Votes:**	0

Labels:	None
Remaining Estimate:	4 hours
Time Spent:	15 hours
Original estimate:	1 day
Rank:	2
Sprint:	Sprint-3

Generated at Fri Nov 18 18:26:22 UTC 2022 by Saibalaji Sm using Jira 1001.0.0-SNAPSHOT#100210-sha1:9b34d7cc56ccedf37042f403595483f2079121f4.

PAFSWASR-4:

[PAFSWASR-4] Simulation of device for medicine remainder *Created: 18/Nov/22 Updated: 18/Nov/22*	
Status:	Done
Project:	Personal assistance for seniors wo are self-reliant
Components:	Wokwi Simulator
Affects versions:	None

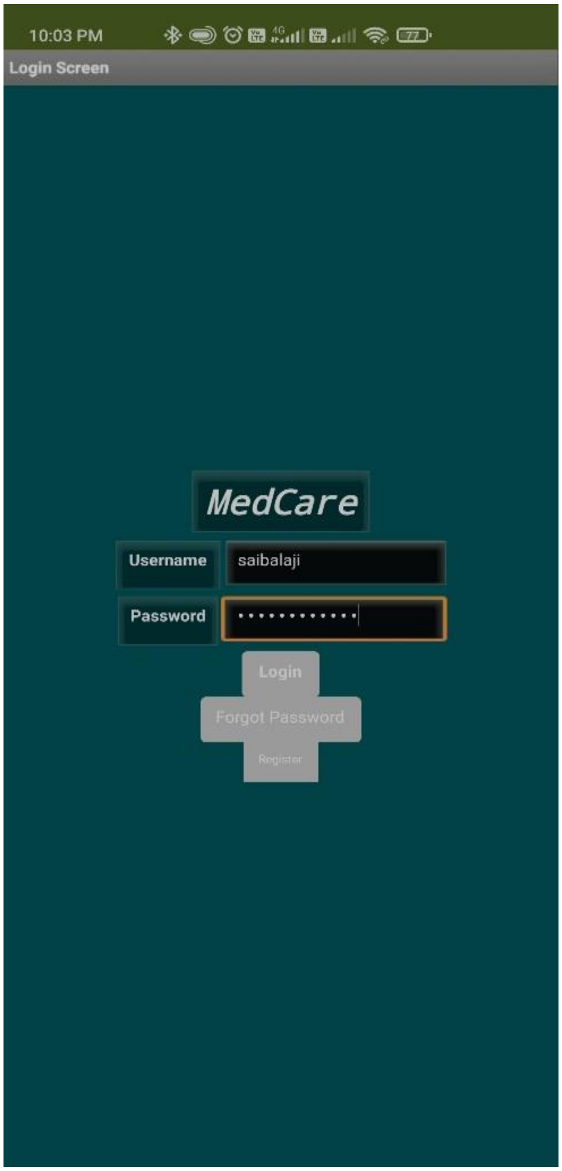
Fix versions:	None		
Type:	Task	**Priority:**	Medium
Reporter:	Saibalaji Sm	**Assignee:**	balamurugansam45
Resolution:	Done	**Votes:**	0
Labels:	None		
Remaining Estimate:	2 hours		
Time Spent:	20 hours		
Original estimate:	22 hours		
Attachments:	Sprint-4.pdf		
Rank:	1		
Sprint:	Sprint-4		

Generated at Fri Nov 18 18:36:52 UTC 2022 by Saibalaji Sm using Jira 1001.0.0-SNAPSHOT#100210-sha1:9b34d7cc56ccedf37042f403595483f2079121f4.

7. CODING & SOLUTIONING

7.1. Feature 1

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

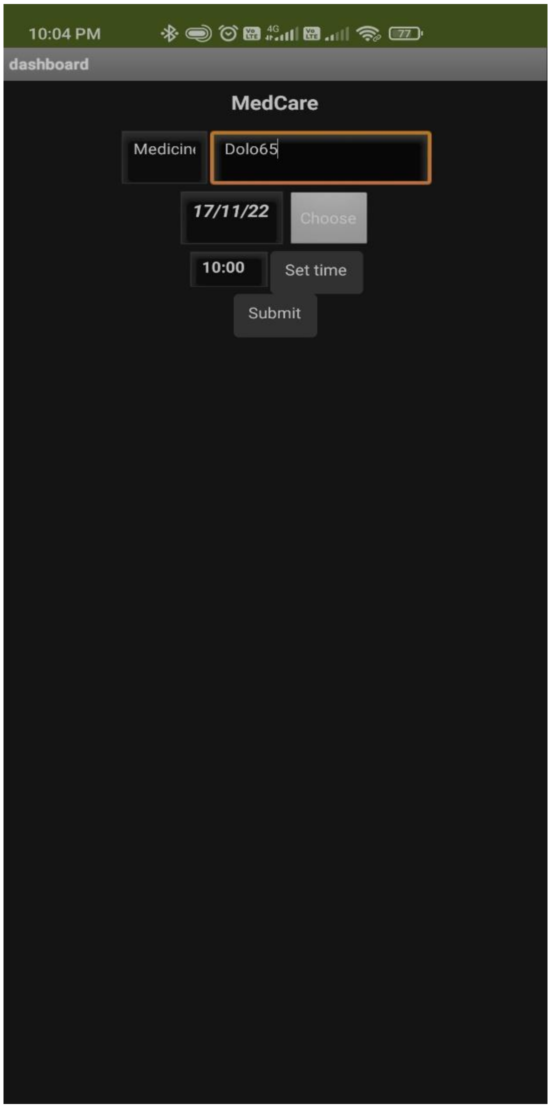


Username saibalaji

Password ••••••••••••

7.2. Feature 2

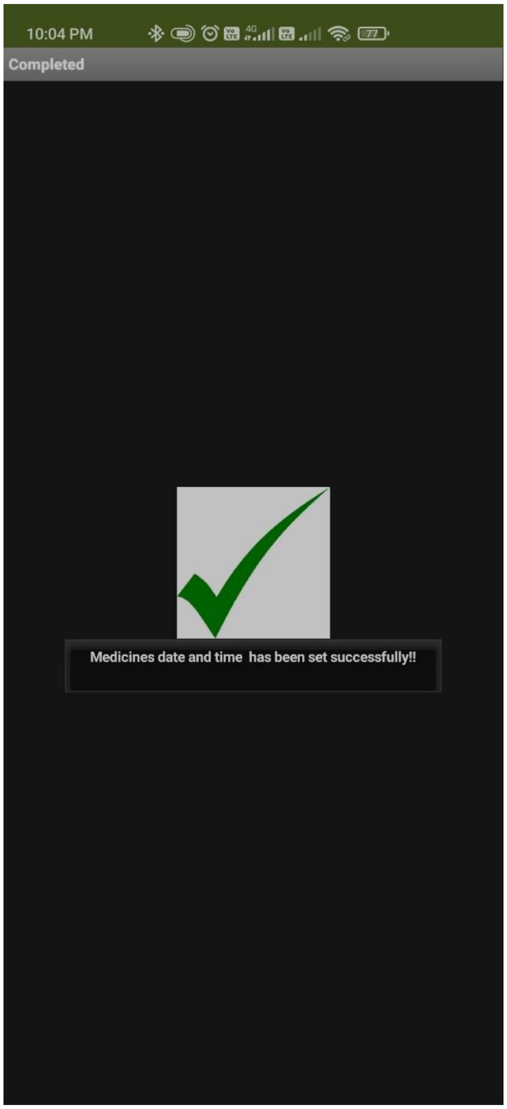
The mobile application also has the feature of uploading medicine names in the cloud.



Dolo65

17/11/22

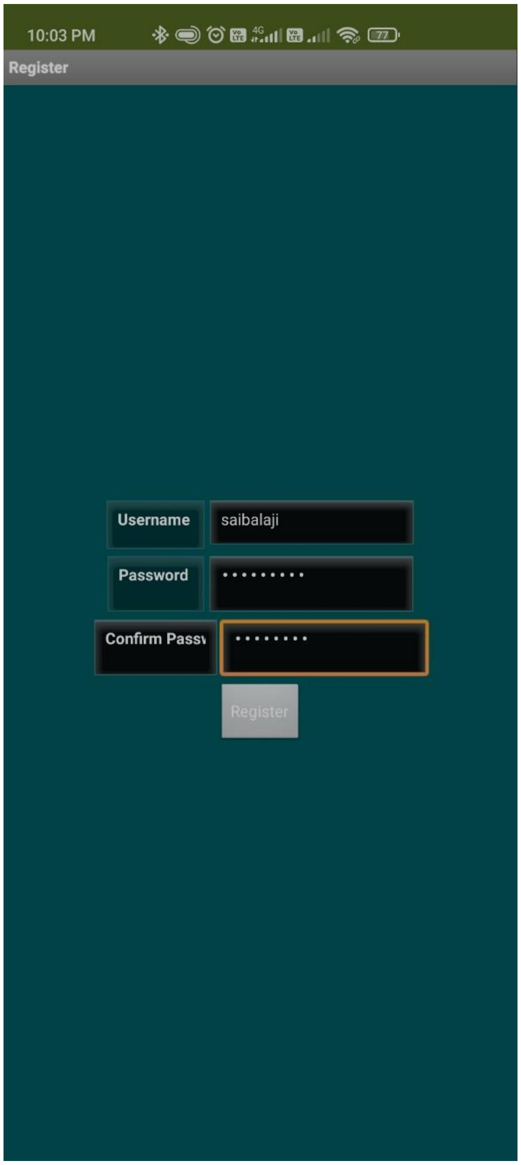
10:00



Medicines date and time has been set successfully!!

7.3. Feature 3

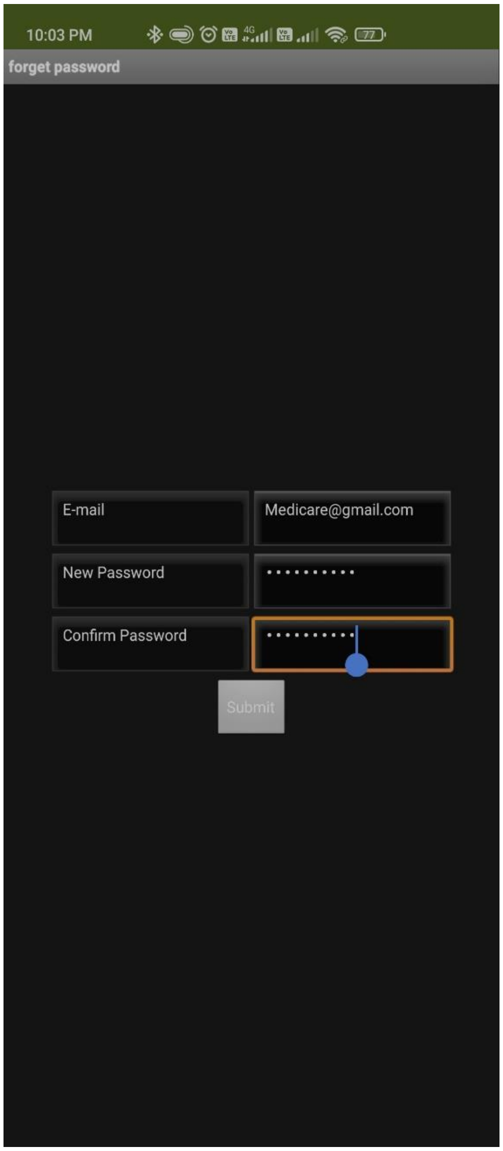
The mobile application also has the feature of registering username in the database and forgot password feature.



Username saibalaji

Password •••••••••

Confirm Passv ••••••••



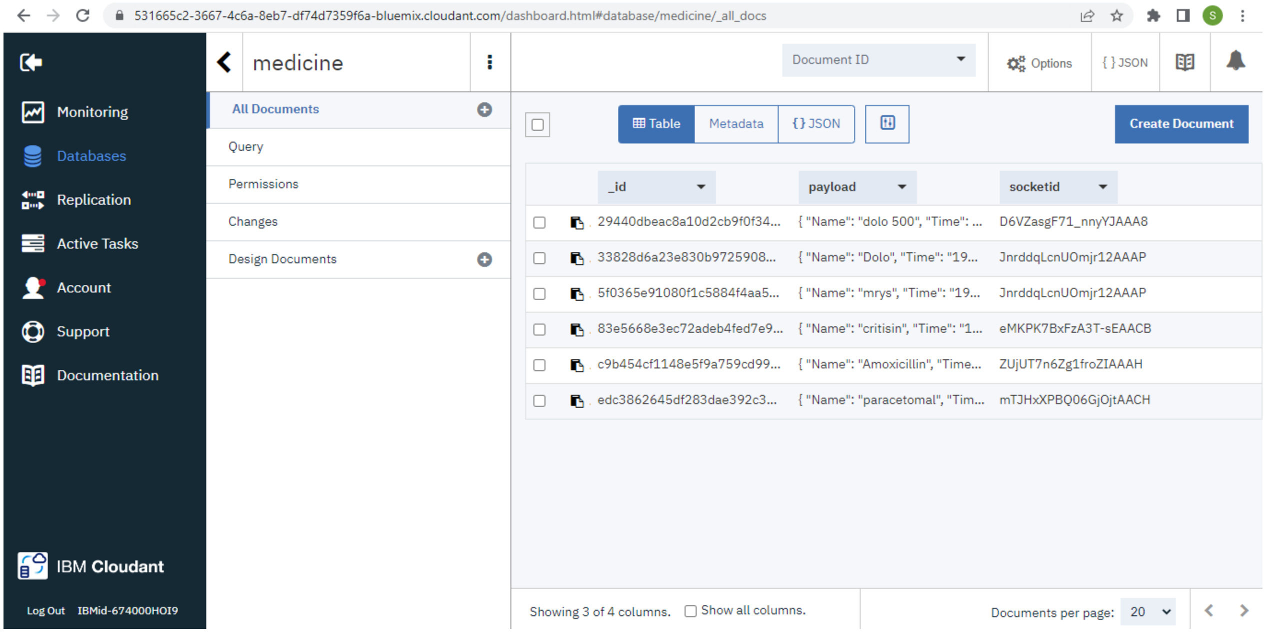
E-mail Medicare@gmail.com

New Password ••••••••••

Confirm Password ••••••••••

7.4. Feature 4

The project includes a cloud database system.



_id	payload	socketid
29440dbeac8a10d2cb9f0f34...	{ "Name": "dolo 500", "Time": ...	D6VZasgF71_nnyYJAAA8
33828d6a23e830b9725908...	{ "Name": "Dolo", "Time": "19...	JnrddqLcnUOmjr12AAAP
5f0365e91080f1c5884f4aa5...	{ "Name": "mrys", "Time": "19...	JnrddqLcnUOmjr12AAAP
83e5668e3ec72adeb4fed7e9...	{ "Name": "critisin", "Time": "1...	eMKPK7BxFzA3T-sEAACB
c9b454cf1148e5f9a759cd99...	{ "Name": "Amoxicillin", "Time...	ZUjUT7n6Zg1froZIAAAH
edc3862645df283dae392c3...	{ "Name": "paracetomal", "Tim...	mTJHxXPBQ06GjOjtAACH

Showing 3 of 4 columns. □ Show all columns. Documents per page: 20

8. TESTING

8.1. TEST CASES

A test case is a document which has a set of conditions or actions that are per formed on thesoftware application in order to verify the expected functionalit y of the feature.After test scripts, test cases are the second most detailed way of documenting testing work.They describe a specific idea that is to be tested , without detailing the exact steps to be taken

or data to be used. For example, in a test case, you document something like 'Test if coupons

can be applied on actual price'. This doesn't mention how to apply the coup ons or whether

there are multiple ways to apply. It also doesn't mention if the tester uses ali nk to apply adiscount, or enter a code, or have a customer service apply it. They give flexibility to thetester to decide how they want to execute the test.

Test Case Format

The primary ingredients of a test case are an ID, description, bunch of inputs, few actionablesteps, as well as expected and actual results. Let’s learn what each of them is:

- **Test Case Name**:A test case should have a name or title that is self explanatory.
- **Test Case Description:**The description should tell the tester what they’re going to test in brief.
- **PreConditions:**Any assumptions that apply to the test and any preconditionsthat must be met prior to the test being executed should be listed here.
- **Test Case Steps:**The test steps should include the necessary data and information on how to execute the test. The steps should be clear and brief, without leaving out essential facts.
- **Test Data:**It’s important to select a data set that gives sufficient coverage.Select a data set that specifies not only the positive scenarios but negative ones as well.
- **Expected Result**:The expected results tell the tester what they should experience as a result of the test steps.
- **Actual Result:**They specifies how the application actually behaved while test cases were being executed.

- **Comments:**Any other useful information such as screenshots that t ester want’s to specify can be included here.

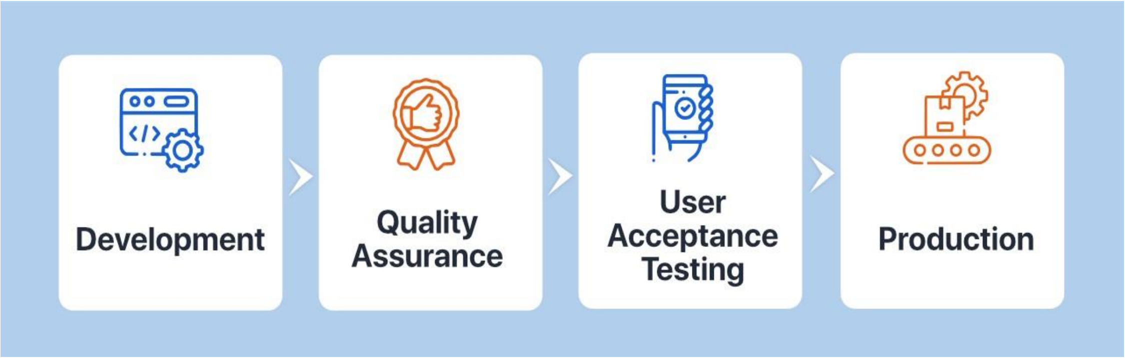
8.2.USER ACCEPTANCE TESTING

1.Purpose of Document

The main Purpose of UAT is to validate end to end business flow. It does not focus on cosmetic errors, spelling mistakes or system testing. User Acceptance Testing is carried out in a separate testing environment with production-like data setup. It is kind of black box testing where two or more end-users will be involved.

UAT is performed by :

- Client
- End users



2.Defect Analysis

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	4	3	2	1	10
Duplicate	1	0	3	0	4
External	2	2	1	1	6
Fixed	4	3	5	19	31
Not Reproduced	1	0	1	1	3
Skipped	0	0	1	1	2
Won't Fix	1	3	2	2	8
Totals	13	11	15	25	64

3.Test Case Analysis:

Section	Total Cases	Not Tested	Fail	Pass
Login Page	5	0	0	5
Node Red Dashboard	32	0	0	32
IBM Watson IOT platform	2	0	0	2
MIT App Inventor	3	0	0	3

9. RESULTS

9.1.PERFORMANCE METRICS

These metrics are used to track and measure the effectiveness and profitability of various projects. Each stage of the project is tracked and measured against the goals that the project set out to achieve. The data compiled from the metrics can be used to plan future projects and gives insight on how to make projects more efficient.

10. ADVANTAGES & DISADVANTAGES

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.

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 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 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

Device Simulation:

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include <LiquidCrystal_I2C.h>
#include "DHT.h"// Library for dht11
```

```
#define DHTPIN 15     // what pin we're connected to
#define DHTTYPE DHT11   // define type of sensor DHT 11
#define LED 2
DHT dht (DHTPIN, DHTTYPE);// creating the instance by passing pin and typr of dht connected
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);

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

#define ORG "kizp10"//IBM ORGANITION ID
#define DEVICE_TYPE "IOTdevice"//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "1234567890"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "1234567890"     //Token
String data3="";
int buzz= 13;
//-------- 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/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 your medicines”);
  if(data3 != "")
  {
    lcd.init();
    lcd.print("Its time for your medicine”);

digitalWrite(LED,HIGH);
delay(20000);
digitalWrite(LED,LOW);

  }

  else
  {
digitalWrite(LED,LOW);

  }
data3="";
}
```

Database connection:

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random

#Provide your IBM Watson Device Credentials
organization = "kizp10"
deviceType = "IOTdevice"
deviceId = "1234567890"
authMethod = "token"
authToken = "1234567890"

# Initialize GPIO
def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if status=="lighton":
        print ("led is on")
    elif status == "lightoff":
        print ("led is off")
    else :
        print ("please send proper command")
```

```
try:
     deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method": authMethod, "auth-token": authToken}
     deviceCli = ibmiotf.device.Client(deviceOptions)
     #..............................................

except Exception as e:
     print("Caught exception connecting device: %s" % str(e))
     sys.exit()

# Connect and send a datapoint "hello" with value "world" into the cloud as an event of type "greeting" 10 times
deviceCli.connect()

while True:
    #Get Sensor Data from DHT11

    temp=random.randint(90,110)
    Humid=random.randint(60,100)

    data = { 'temp' : temp, 'Humid': Humid }
    #print data
    def myOnPublishCallback():
      print ("Published Temperature = %s C" % temp, "Humidity = %s %%" % Humid, "to IBM Watson")
```

```
        success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0,
on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(10)

        deviceCli.commandCallback = myCommandCallback

# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

Text-to-Speech:

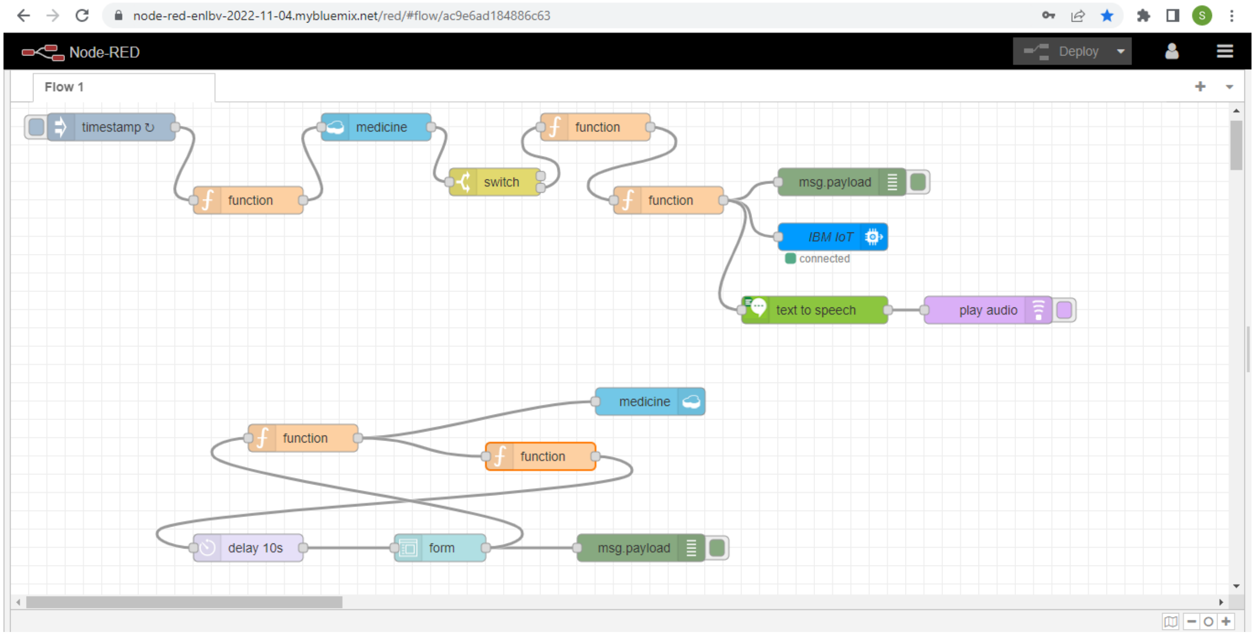
```
from ibm_watson import TextToSpeechV1
from ibm_cloud_sdk_core.authenticators import IAMAuthenticator

authenticator =
IAMAuthenticator('KSTdsMPsUS62SL58EqzaZbAFtEW2JlggKYHUI-
NKLuvx')
text_to_speech = TextToSpeechV1(
    authenticator=authenticator
)
```

```
text_to_speech.set_service_url('https://api.eu-gb.text-to-speech.watson.cloud.ibm.com/instances/10758658-1ffd-49e5-ae59-ffb2aaa3b131')

with open('Medicine.wav', 'wb') as audio_file:
    audio_file.write(
        text_to_speech.synthesize(
            'Its time for your medicine',
            voice='en-US_AllisonV3Voice',
            accept='audio/wav'
        ).get_result().content)
```

Node-red Flows:



Flows.json:

```
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```

]]},{"id":"89f826db8e77a778","type":"function","z":"ac9e6ad184886c63","n
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utc=d.getTime()+(d.getTimezoneOffset()*60000);\nvar offset =
5.5;\nnewDate = new Date(utc+(3600000*offset));\nvar n
=newDate.toISOString()\nvar date = n.slice(0,10)\nvar
time=n.slice(11,16)\nglobal.set(\"time\",time)\nmsg.payload=date+\"
\"+time\nreturn
msg;","outputs":1,"noerr":0,"initialize":"","finalize":"","libs":[],"x":260,"y":1
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891bac1a","outputType":"cmd","deviceId":"1234567890","deviceType":"2.2
.2","eventCommandType":"command","format":"json","data":"Data","qos":0
,"name":"IBM
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d=msg.payload.date\nvar t=msg.payload.time\nvar date=d.slice(0,10)\nvar
time=t.slice(10,25)\nvar hit=new
Date(date+time)\nhit.setDate(hit.getDate()+1);\nvar
utc=hit.getTime()+(hit.getTimezoneoffset()*60000);\nvar
offset=5.5\nnewDate= new Date(utc+(3600000*offset));\nvar
n=newDate.toISOString()\nvar da=n.slice(0,10)\nvar
ti=n.slice(11,16)\nmsg.payload={\n   \"_id\":da+\" \"+ti,\n
\"name\":msg.payload.name,\n}\nreturn
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","name":"","func":"var st={\"please take
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ad.replace(':',");\nreturn
msg;","outputs":1,"noerr":0,"initialize":"","finalize":"","libs":[],"x":720,"y":1
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"]]},{"id":"c21434afa56c67cf","type":"cloudant","host":"https://apikey-v2-
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GitHub link: https://github.com/IBM-EPBL/IBM-Project-18767-1659689727