

# **PERSONAL ASSISTANCE FOR SENIORS WHO ARE SELF-RELIANT**

SUBMITTED BY

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## 1.ABSTRACT :

In modern society, busy life has made people forget many things in day to day life. The elderly people and the people victims of chronicle diseases who need to take the medicines timely without missing are suffering from dementia, which is forgetting things in their daily routine. Many Harmful and risky diseases can be cured through proper medication. The proposed system consists of an IOT enabled medication reminder system and it gives timely alerts for the patients about their medication time. It alerts the patient to take medicines at proper time. The system helps to monitor whether patient has taken the medicine.

### 1.1INTRODUCTION :

To support in-home health care activities, As part of an initiative investigating technology solutions we created several concepts of a multi-device, home-centred system that would use television (TV) along with set-top box (STB), mobile phones and other in-home devices as a means to set and deliver medication reminders. To eliminate the factors of always needed observation like nurses or taking the risk of a missed dose, we had to find an easy, portable and efficient solution. To assess the value of these concepts, we conducted a focus group study with the following goals:

- 1) To understand the current practices and challenges faced by our potential users (Le., middle aged and senior adults living independently) in managing their medications.
- 2) To assess the potential value of TV ,mobile phones and other in[1]home devices for delivering medication reminders.
- 3) To identify additional user needs to support home-centred medication management activities.

## 2.LITERATURE SURVEY:

### 2.1Existing Problem:

Poor medication adherence still remains a major challenge facing most industrialized countries including the United States, leading to worsening disease severity and increased costs associated with higher hospital admission rates . According to the American Heart Association, more than half of all Americans with chronic disease do not follow their physician's medication and lifestyle guidance, and nine out of ten

make mistakes taking their medication . In the U.S. alone, non[1]adherence to medications causes 125,000 deaths annually and accounts for 10% to 25% of hospital and nursing home admissions, with the annual direct and indirect cost of non-adherence estimated to be over \$177 billion . Recent literature show that, despite extensive research into interventions for assisting with adherence, rates of adherence have not changed over the past three decades . Previous research found that forgetfulness is one of the most common factors contributing to poor adherence, along with the complexity of the regimen and disruption of daily routines . Other studies have shown that medications are taken at various locations and in various contexts within the home; therefore, home computers are of marginal utility in this space since few people take their medications near them .

Pillboxes already exist, but most of them have limited use, don't fit for elder ages, or even have a big size that makes them unsuitable to take it with you anywhere . Making a useful smart pillbox had to be easily integrated with the recent sweeping smart technologies. While at the same time, it had been fit for the elders and their limited knowledge and experience to implement the ease of use. Size and portability was also an important fact European Journal of Molecular & Clinical Medicine ISSN 2515-8260 Volume 07, Issue 09, 2020 2711 that we had to keep in mind It's connected through a wireless network for it to be called smart, which enables it to be connected to the internet for future applications and integration.

Also, it is distinguished by the wide range of Wi-Fi instead of Bluetooth or any other field communication and erase the need for any wires or wired connection, which enables portability in the first place. Through that same network, it's connected to the mobile phone, which with it you can set the timing interval for the dose and notifies you in many ways when the dose time comes. Also, we added a buzzer with a LED to make a type of physical warning so that it leaves you no choice but to remember the pill time and take it As pills have taken such an important role in everyday life, there has been the past years an increase in the number of medical negligence cases related to incorrect medication given to patients, such as the case of the nurse who gave a patient a person with paralysis instead of an antacid that was prescribed by the doctor, causing the patient's death. After seeing so many of these cases, the correct person must take the correct pill at the correct time, otherwise taking an incorrect one or not taking one at all may expose the patient to several dangerous situations, ranging from mild health issues up to death.

All of these results suggest that automated medication reminders

through multiple devices within the home might be helpful technology interventions for improving adherence.

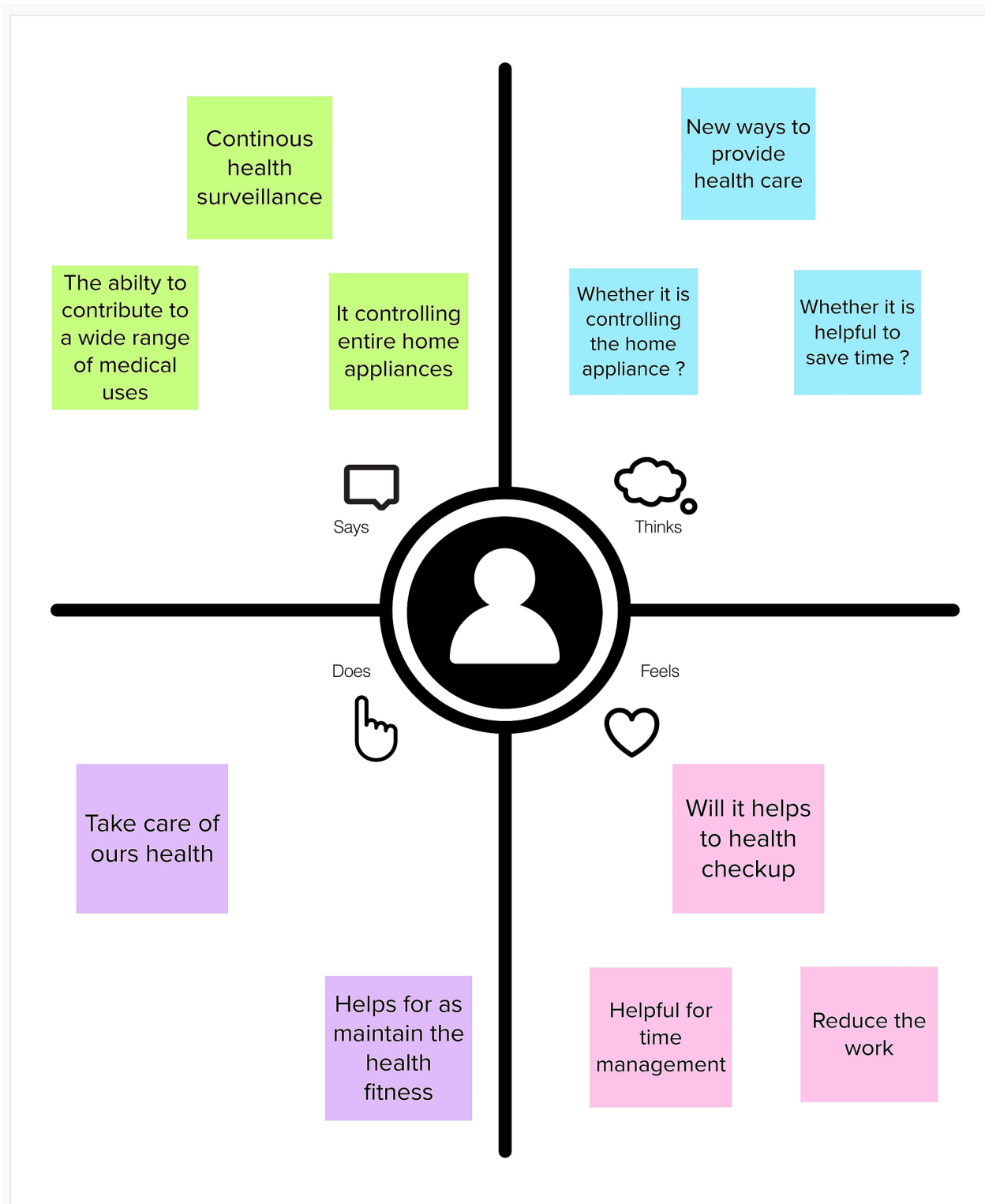
## 2.2 Problem Statement Definition:

How to remind the peoples to take the correct medicine on time?

Skipping of medicine or taking wrong medicine will cause a problem in future so to make the people to take correct medicine on time.

### 3. IDEATION & PROPOSED SOLUTION:

#### 3.1 Empathy map:

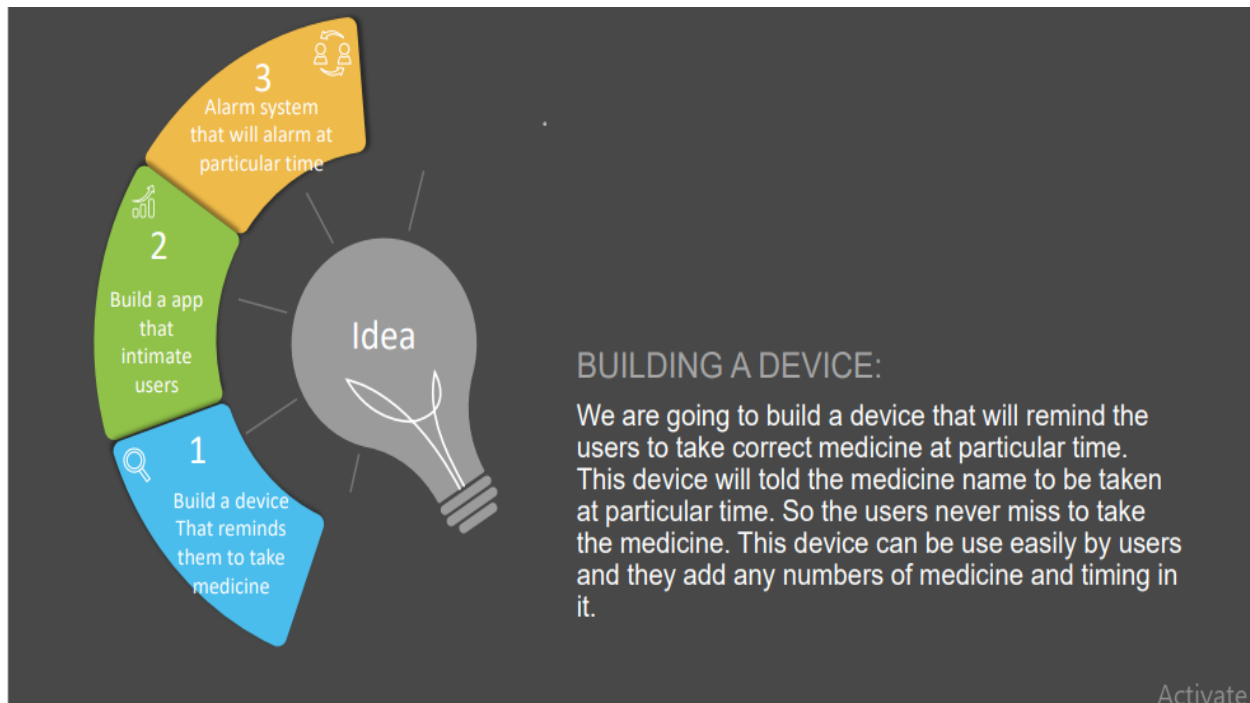


### 3.2 Proposed Solution:

SNo	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 ones 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 personas, 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 remainder up to year.

### 3.3 Ideas:

We have brainstormed different ideas and selected proposed one idea for the project.



### 3.4 Problem Solution Fit:

<b><u>1.Customer segments:-</u></b>  The customer who are going to use this project includes Old age peoples. Who will forget to take the medicine at correct time.	<b><u>6.Customer constrains:-</u></b>  Due to busy works some peoples may forget to take the medicine. Old age peoples may get confuse what medicine need to take at particular time.	<b><u>5.Available solutions</u></b>  Having a person to remind peoples to take medicine. Using mobile application to remind them. Using a IOT enabled device.
<b><u>2.Jobs to be done :-</u></b>  Iot devices connects and interacts with each other,and the internet which means they can work together to alert peoples to take the medicine at correct time.	<b><u>9.Problem route cause:</u></b>  By adopting IOT in the medicine field will definitely helps the peoples to maintain their health at good condition.	<b><u>7.Behavior:-</u></b>  The customer wants to maintain their health at good condition by taking the correct medicine at correct time.

<p><b>3.Triggers:-</b></p> <p>Helps peoples to take the correct medicine at correct time.</p>	<p><b>10.Solution:-</b></p> <p>Our solution is to create a IOT enabled device to remind the peoples to take the correct medicine at correct time.</p>	<p><b>8.Channels of behavior:-</b></p> <p>The channels of behavior recombine the ratio of the following Online</p>
<p><b>4.Emotions:-</b></p> <p>Peoples always want to over come from the disease they are having.</p>		Activate W

#### 4.REQUIREMENT ANALYSIS :

##### 4.1 Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement(Epic)	SubRequirement (Story / Sub-Task)
FR-1	User Registration	Register through Email  Register through mobile number.
FR-2	User Confirmation	Confirmation via Email. . Confirmation via OTP.
FR-3	Access Cloudservices	Access the cloud servicewith correct credentials Store the detailsin the databaseRetrieve needed information for the user's operation
FR-4	IOT configuration	Fine Tuning the IOT device basedon preference Access the Cloud DB via device Manage the request andresponse effectively



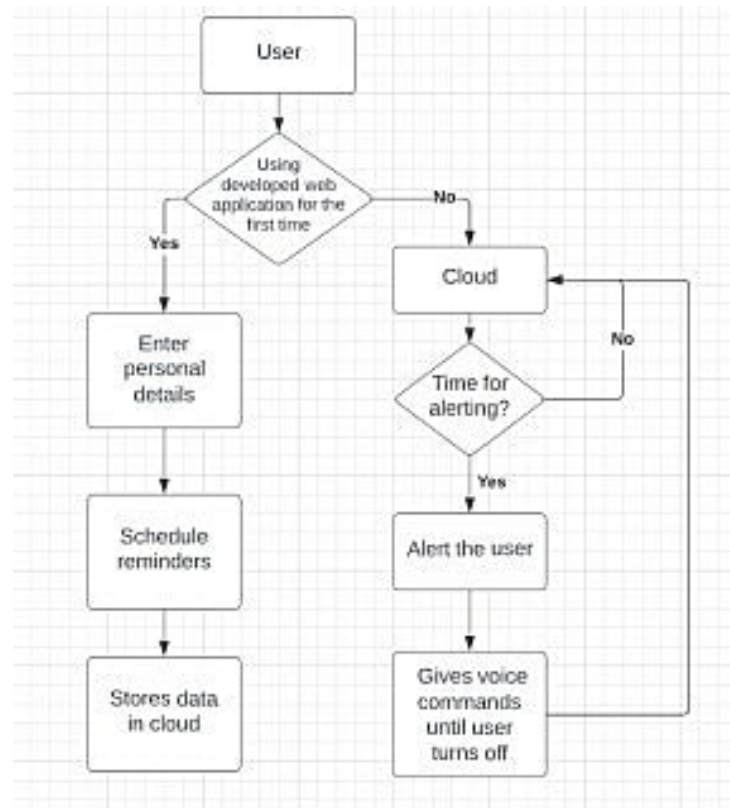
#### 4.2 Non-Functional Requirements:

Following are the Non-Functional requirement of the proposed solution.

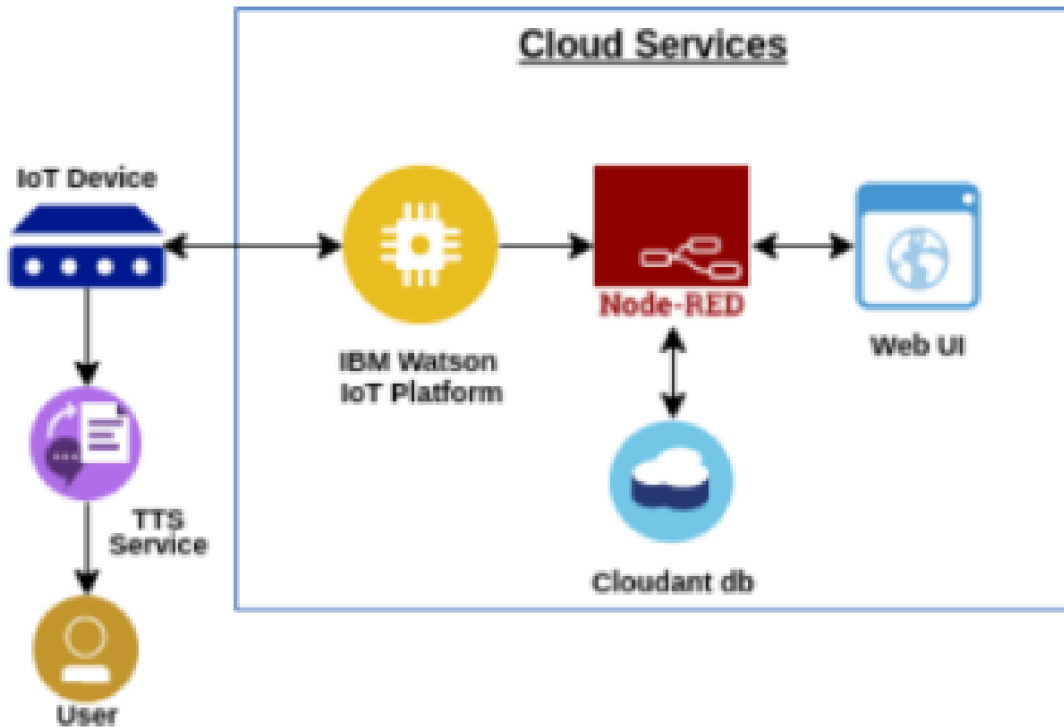
<b>FR No.</b>	<b>Non-Functional Requirement</b>	<b>Description</b>
NFR-1	<b>Usability</b>	App can be used by anyone who has operational knowledge about internet and computer.
NFR-2	<b>Security</b>	For security, TFA is enabled and biometrics are also added for user safety.
NFR-3	<b>Reliability</b>	Highly reliable since, It uses Trusted cloud services like IBM
NFR-4	<b>Performance</b>	Performance is better compared to other market products.
NFR-5	<b>Availability</b>	Available on mobile app. Web version is getting ready for next release.
NFR-6	<b>Scalability</b>	Using Cloud services, makes the scalability higher than using traditional database.

## 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 (Mobile user)	Registration	USN1	As a user, I can register for the application by entering my email or mobile number, password, and confirming my password.	I can access my account / dashboard	High	Spint - 1

		USN2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	S p r i n t - 1
		USN3	As a user, I can register for the application through Gmail		Medium	S p r i n t - 1
	Login	USN4	As a user, I can log into the application by entering email or mobile number & password	I can access my account / dashboard	High	S p r i n t - 1

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
	Dashboard	USN5	As a user, I can update my reminders and medicines wherever required		High	Spri n t - 2
		USN6	As a user, I can check the application whether the medicine dosage is completed.		Medium	Spri n t - 2
Customer Care Executive		USN7	For any troubleshooting, the user can send a mail to the technical team.		Low	
Administ rator		USN8	Ensures smooth functioning and data warehousing strategies		Medium	Spri n

**6.PROJECT PLANNING AND SCHUDLING:**

Sprint Planning:

Sprint-1:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Resources Initialization	US-1	Create the IBM Cloud services which are beingused in this project.	6	High	Nagenthiran M Naveenkumar S Mathivanan B Kaviyarasan P
Sprint-1	Create and initialize accounts in various public APIs	US-2	Configure the IBM Cloud services whichare being used in completi ng this project.	4	Medium	Nagenthiran M Naveenkumar S Mathivanan B Kaviyarasan P
Sprint-1	Local Server/Softw are Run	US-3	IBM Waston IOT platform acts as the mediator to connect the web applicati	5	Medium	Nagenthiran M Naveenkumar S Mathivanan B Kaviyarasan P

			on to IOT devices, so create the IBM Watson IOT platform.			
Sprint-1	Write a Python program that outputs results given the inputs.	US-4	In order to connect the IoT device to the IBM cloud, create a device in the IBM Watson IoT platform and get the device credentials.	5	High	Nagenthiran M Naveenkumar S Mathivanan B Kaviyarasan P

#### Sprint-2:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2	Push the server/software to cloud	US-1	Configure the connection security and create API keys that are used in the Node-	10	High	Nagenthiran M Naveenkumar S Mathivanan B Kaviyarasan P

			RED service for accessing the IBM IOT platform.			
Sprint-2	Push the code from Sprint 1 to cloud so it can be accessed from anywhere	US-2	Create a Node-RED service.	10	High	Nagenthiran M Naveenkumar S Mathivanan B Kaviyarasan P

Sprint-3:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Hardware initialization	US-1	Develop a python script to publish random sensor data such as temperature, humidity, rain to the IBM IOT platform	7	High	Nagenthiran M Naveenkumar S Mathivanan B Kaviyarasan P
Sprint-3	Integrate the hardware to be able to access the cloud functions	US-2	After developing python code,	5	Medium	Nagenthiran M Naveenkumar S



	and provide inputs to the same.		commands are received just print the statements which represent the control of the devices.			Mathivanan B Kaviyarasan P
Sprint-3		US-3	Publish Data to The IBM Cloud	8	High	Nagenthiran M Naveenkumar S Mathivanan B Kaviyarasan P

#### Sprint-4:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-4	UI/UX Optimization & Debugging	US-1	Create Web UI inNode-Red	10	High	Nagenthiran M Naveenkumar S Mathivanan B Kaviyarasan P
Sprint-4		US-2	Configure the Node-REDflow to receive data from the IBM IoT platformand also use Cloudant DB nodes to store the received sensor data in thecloudant DB	10	High	Nagenthiran M Naveenkumar S Mathivanan B Kaviyarasan P

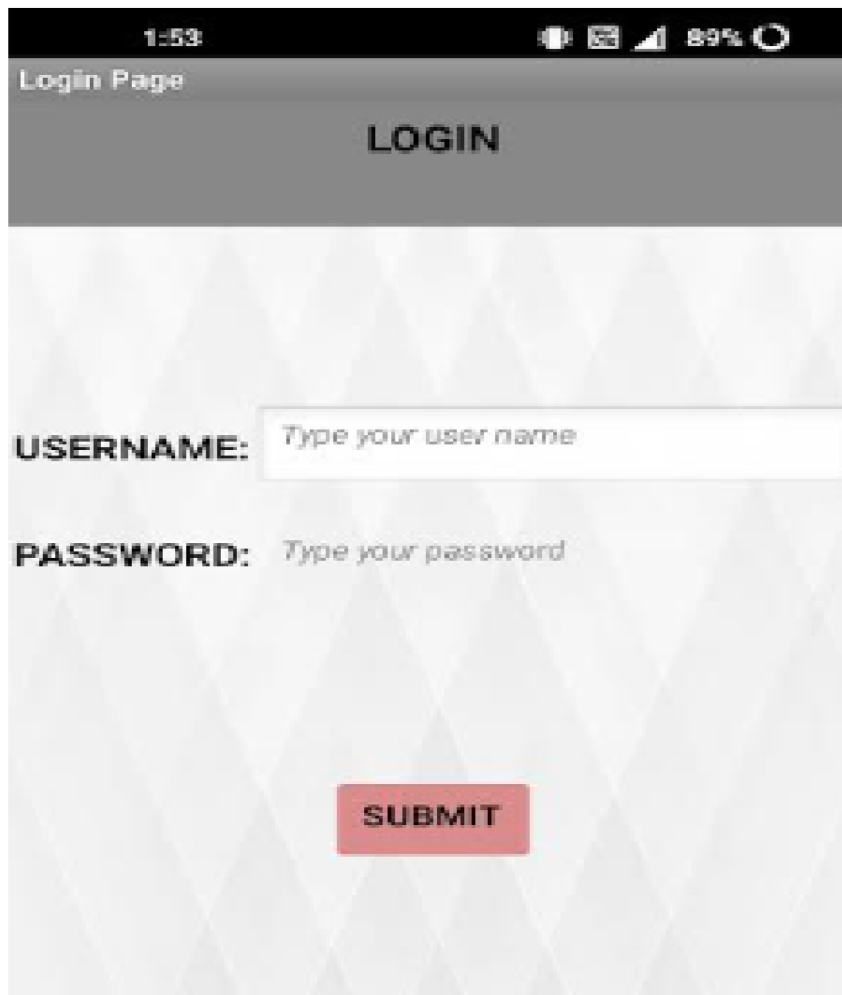
#### Sprint Delivery Schedule:

Sprint	Total Story Points	Duration Start Date Sprint End Date(Planned)	Story Points Completed(as on Planned End Date)	Sprint Release Date(Actual)
Sprint-1	20	7 Days 3rd Nov to 10th Nov 2022	20	10 Nov 2022
Sprint-2	20	5 Days 6th Nov to 11th Nov 2022	20	11 Nov 2022
Sprint-3	20	4 Days 8th Nov to 11th Nov 2022	20	11 Nov 2022
Sprint-4	20	2 Days 13th Nov to 15th Nov 2022	20	15 Nov 2022

#### Coding and Solutioning

##### Feature 1

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



### **7.2.Feature 2**

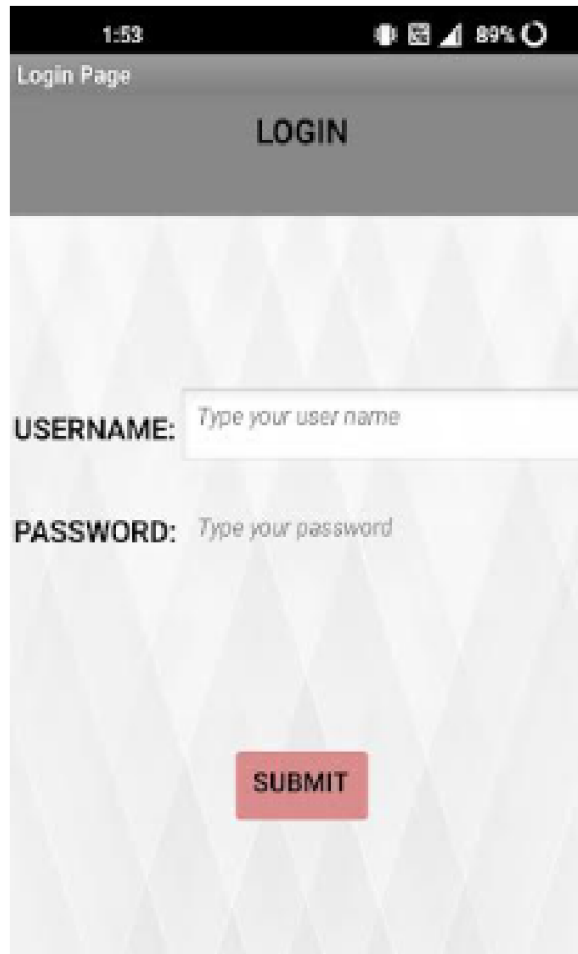
The mobile application also has the feature of uploading medicine names in the cloud.



Verify login with valid credentials	User should have a network connection	<ol style="list-style-type: none"> <li>1. Launch URL</li> <li>2. Enter valid username.</li> <li>3. Enter valid password.</li> <li>4. Click on the "Login" button.</li> </ol>	Username: Navya Password: 12345	Users should be able to login successfully.
Verify login with invalid credentials	User should have a network connection	<ol style="list-style-type: none"> <li>1. Launch URL</li> <li>2. Enter valid username.</li> <li>3. Enter invalid password.</li> <li>4. Click on the "Login" button.</li> </ol>	Username: Navya Password: Navya123	Users should not be able to login.
Update the medicine name with the time.	User should have a network connection	<ol style="list-style-type: none"> <li>1. Enter valid medicine name.</li> <li>2. Enter the time when the medicine has to be consumed.</li> <li>3. Click on the "Submit" button.</li> </ol>	Medicine Name: Cetirizine Medicine Time: 20.00	Users should be able to update it successfully.

**User acceptance testing**

**Login page testing**

A screenshot of a mobile application's login page. The status bar at the top shows the time 1:53, signal strength, Wi-Fi, and 89% battery. The app's title bar says "Login Page". Below it is a dark grey header with the word "LOGIN" in white. The main area has a light grey background with a subtle geometric pattern. It contains two input fields: "USERNAME:" with a placeholder "Type your user name" and "PASSWORD:" with a placeholder "Type your password". A red "SUBMIT" button is at the bottom.

1:53 89%

Login Page

LOGIN

USERNAME:

PASSWORD:

SUBMIT

**Medicine page testing**

2:00 88%

Medicine Details

Welcome!!!

Please enter the medicine name and time below

Medicine Name: Crocin

Medicine Time: 14:01

SUBMIT

Updated Successfully

Logout

## Results:

### 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.

## 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.

## 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.

## 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.

### a. **Appendix**

#### **Source Code:**

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQTT
#include "SoundData.h"
#include "XT_DAC_Audio.h"
XT_Wav_Class
Sound("voice_command.wav");
XT_DAC_Audio_Class
DacAudio(2,0); uint32_t
```



```
DemoCounter=0;
```

```
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
```

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

```
#define ORG "ut4tn5"//IBM ORGANITION ID
```

```
#define DEVICE_TYPE "Arduino"//Device type mentioned in ibm watson IOT  
Platform
```

```
#define DEVICE_ID "nitish123"//Device ID mentioned in ibm watson IOT  
Platform
```

```
#define TOKEN "123456789"
```

```
//Token String data3; float h, t;
```

```
//----- 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/test/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
```

```
//-----
```

```
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);
```

```
  delay(10);
```

```

Serial.println();
wificonnect();
mqttconnect();
}

void loop()// Recursive Function
{

    delay(100
0); if
(!client.lo
op()) {
    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("data: "+ data3);
  if(data3=="announce")

```

```
{  
Serial.println(data  
3); for(int  
i=0;i<5;i++){  
DacAudio.FillBuffer();  
if(Sound.Playing==false)  
DacAudio.Play(&Sound);  
Serial.println(DemoCounter++);  
}  
}  
  
else  
{  
Pass;  
}  
data3=" ";  
}
```

**Github link:** [IBM-EPBL IBM-Project-39823-1660546906](https://github.com/IBM-EPBL/IBM-Project-39823-1660546906)

**Project demo link :**