PERSONAL ASSISTANCE FOR SENIORS WHO ARE SELF-RELIANT

A PROJECT REPORT

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1. INTRODUCTION

1.1 PROJECT OVERVIEW

Elderly people forgot to take their medicine at the correct time and feels difficult to remember the names of the medicine.The solution is to develop Medicine Reminder System.This app is built for the user which enables him take decried medicine at time by voice command notification.So that the user can feel their health issues under their control.

1.2 PURPOSE

- Our voice command notification will mention the medicine name size and color for better understanding for elders
- 24 x 7 support
- A letter way to organize multiple pills To get update on my family's medication track
- Proper notification for medication in a prescribed manner
- Looking up reviews on certain medicine before taking them
- Get an alert when medication is low
- Find confident in filled detail for alert by getting it verified
- My health issues under my control
- Live independently and happily
- Taking medicine in daily basis
- Feeling control of medication
- Feeling comfortable to talk about my medication
- Not to skip medicine due to improper medicine restocking system

2. LITERATURE SURVEY:

Different papers related to medication reminders were also taken into consideration. "Automatic Pill Dispenser " In this paper, a device consisting of no interference from humans. This system makes use of the concept of rotating compartments in circular stepwise motion using a stepper motor

which is used to store the pills. It also purvey built in an alarming system with the device consisting of LED and Buzzer to indicate the time of medication. But the main disadvantage of this system is, it needs manualhandling of the system. Also they have used smartphones, which are mostly not used by elderly people. [3] In “Pill Dispenser with alarm Via Smartphone notification” system, proposed a dispenser consisting of an alarm system which helps to get alerts in the form of notification on smartphones. They have used the available technology to send notifications on the smartphone using instapush application. After receiving the notification the user needs to press the dispenser button whi ch is located at the pill dispenser unit. But in this system, the userneeds to push the button on the dispensing unit which basically requires energy.

Moreover it makes use of smartphones which are not used by many elderly people [4]. “The Autonomous pill dispenser” The healthcare provider will create medications scheduled using an android app and load medication in the device. At prescribed time, the patient receives text message notification to take the pills. The Android app sends signals to devices via Bluetooth. Patient needs to flip the unit so that one pill gets trapped in the tip of the cone and using vibrator it gets dispensed. So it requires following particular steps for dispensing of medicines which is not easy task for aged people and disabledpeople [5].Also there are several patents published for various

types of medication dispensing devices. A brief summary of the products proposed by each patent is included below: Timed Medicine Dispenser: This Product is basically a timed based dispenser which will give notification to the user about the medication. In the dispenser unit, the pills need to be pre separated first in order to get correct dosage [14].Medicine reminder and dispenser: This device consists of 28 compartments having a slidable plate which supports for dispensing of medicines which are arranged in forms of rows and columns [16]. Med Center Medication Reminder:This device organizes a months worth of medication with 4 daily alarms. Thisconsist idea of color-coding and verbal reminders, for helping people which have complicated medication routines. The medicines have to be pre separated and kept in the appropriate pillbox [17]. Med Time: This product consist of a disk that rotates having several compartments consisting of pills separated within different compartments. It also contains alarm system and a timer, which canprovide sound at particular schedule. For the overall operation the dosages nowadays regarding their medication. One thing that was evident in these writings was that following the doctor's prescriptions timely has become a big

challenge for people nowadays.must be separately put in the compartments which require the help of others [18].Several online articles discussed the hazards and problems people are facingnowadays regarding their

medication. One thing that was evident in these writings was that following the doctor's prescriptions timely has become a big challenge for people nowadays.

2.1 EXISTING SOLUTION

S.NO	PROJECT	METHODOLOGY	LIMITATIONS
1	The Autonomous pill dispenser	Android app sends signals to devices via Bluetooth. Patient needs to flip the unit so that one pill gets trapped in tip of the cone and using vibrator it gets dispensed	Elderly people find this difficult to flip the device and less likely to use android phone
2	Automatic Pill Dispenser	Makes use of the Concept of rotating compartments in circular step wise motion using stepper motor which is used to store the pills. Notification on smartphone is provided	Smartphones are less likely to be used by elderly people.

3	Pill Dispenser with alarm Via Smart phone notification	They have used the available technology to send notifications on the smartphone using instapush application. After receiving the notification user needs to press the dispenser button which is located at pill dispenser unit	Smartphones are rarely used by elderly patients. Cannot be used by blind people, as it needs to press the button on the dispensing unit.
4	Timed Medicine Dispenser(Product)	Gives notification about medication . It has built in alarm system	In dispenser unit, the pills need to be pre separated first in order to get correct dosage. Cannot be used by deaf person. 5

2.2 REFERENCES :

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[13]Praska JL, Kripalani S, Seright AL, Jacobsen TA. Identifying and assisting low- literacy patients with medication use: a survey of community pharmacies. Ann Phar- macother. 2005;39:1441-1445.

[14]Todd Ruppar, PhD, RN, Overcoming Barriers to Medication Adherence for Chronic Diseases. Us Department of health and human services. February 2017

[15]https://www.amazon.in/s?k=Timed+Medicine+DispenserRef=nb_sb_nos

[16]https://www.amazon.in/s?k=.+Medicine+reminder+and+dispenser&ref=nb_sb_noss

[17]https://www.amazon.com/s?k=Med+Center+Medication+ReminderRef=nbsb_noss

[18]https://www.amazon.com/s?k=med+dispenser+3+times+a+day&crid=3TL00T6K4KJO5&sprefix=Med+Time+disp%2Caps%2C365&ref=nb_sb_ss_i_1_13

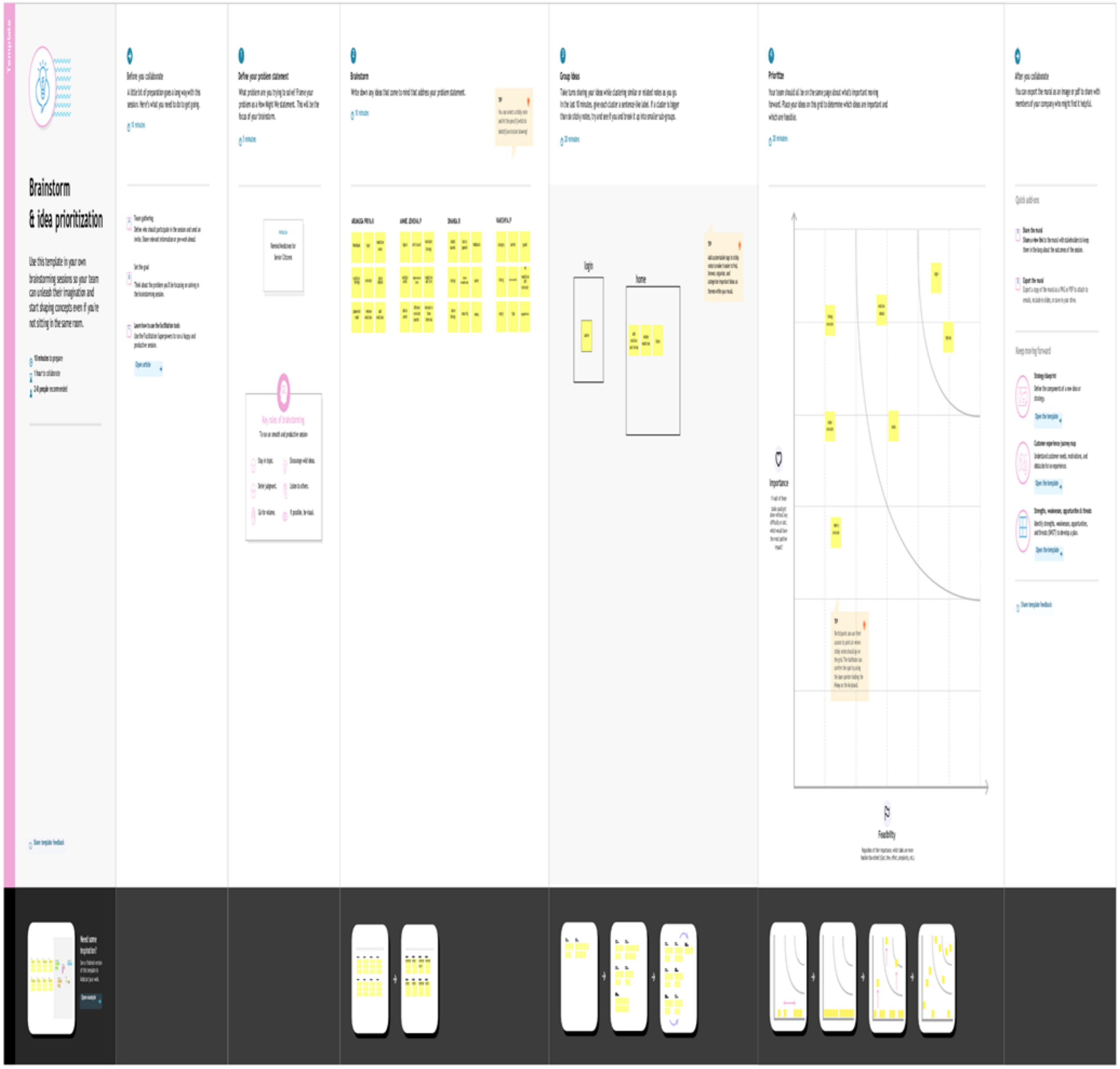
2.3 PROBLEM STATEMENT DEFINITION

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.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 command.

3.IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP

3.2 IDEATION & BRAINSTORMING

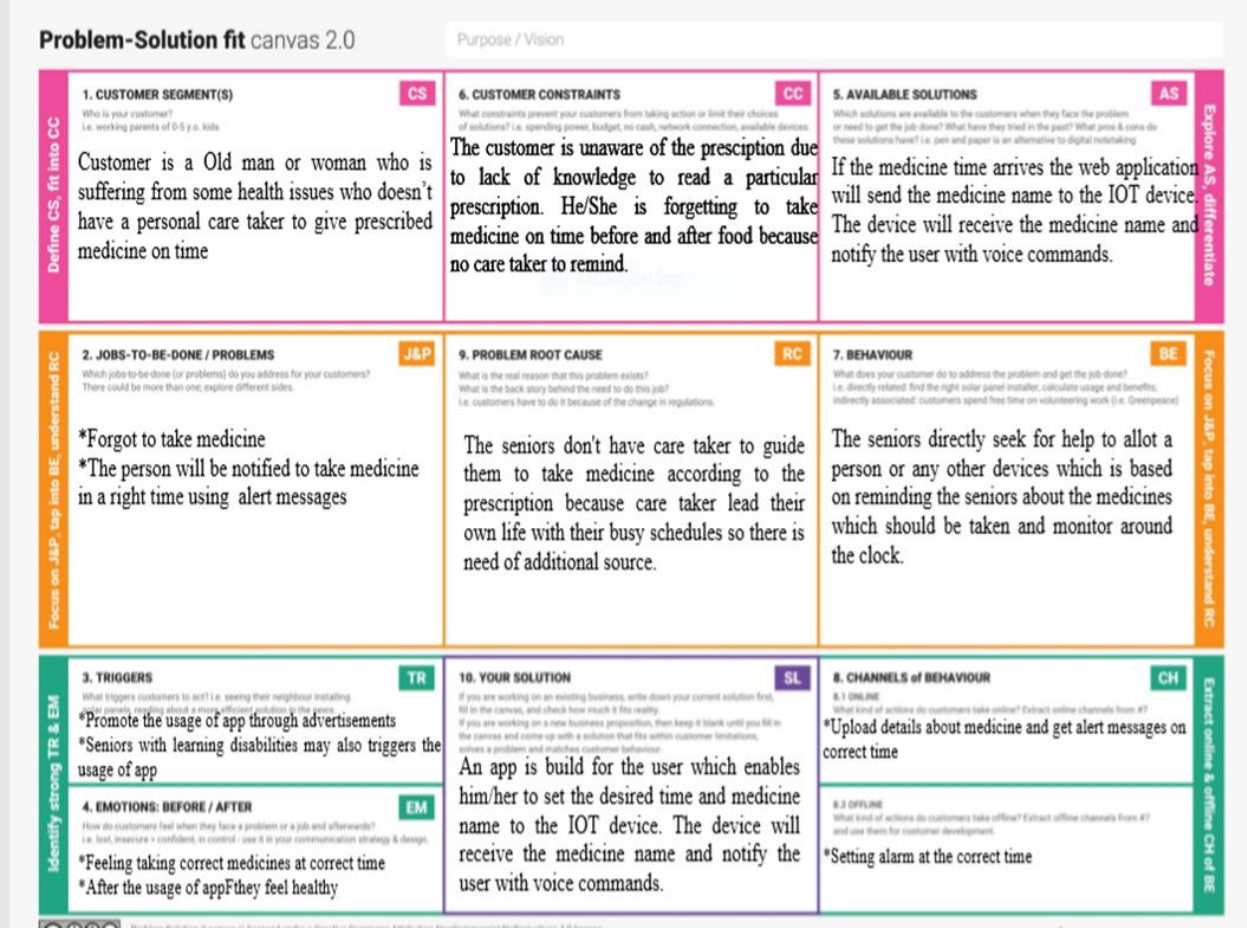

Template
Brainstorm
& idea prioritization
Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.
Before you collaborate
A little bit of preparation goes a long way with this session. Here's what you need to do to get going.
Define your problem statement
Brainstorm
Write down any idea that come to mind that address your problem statement.
Key rules of brainstorming
Stay in topic.
Encourage wild ideas.
Defer judgment.
Listen to others.
Go for volume.
If possible, be visual.
Group ideas
login
home
Prioritize
Importance
Feasibility
After you collaborate
Quick add-ons
Share the mural
Export the mural
Keep moving forward
Strategy blueprint
Customer experience journey map
Strengths, weaknesses, opportunities & threats
Open the template
Need some inspiration?

3.3 PROPOSED SOLUTION

1	**Problem Statement** (Problem to be solved) • Sometimes elderly people forget to take their medicine at the correct time • Also forget which medicine he/she should take at that particular time • It is difficult for doctors/caretakers to monitor the patients around the clock
2	**Idea / Solution description** • The solution is to develop medicine remainder system • An app is built for the user which enables him to set desired time and medicine • If the medicine time arrives the web application will send the medicine name to the user mobile • The user will receive the medicine name,size and colour • It notify the user with voice commands
3	**Novelty / Uniqueness** • Instead of mentioning the medicine name only our voice command notification will mention the medicine name size and colour for better understanding for elders • 24 x 7 support • A letter way to organize multiple pills • To get update on my family's medication track • Proper notification for medication in a prescribed manner • Looking up reviews on certain medicine before taking them • Get an alert when medication is low • Find confident in filled detail for alert by getting it verified
4	**Social Impact / Customer Satisfaction** • My health issues under my control • Live independently and happily • Taking medicine in daily basis • Feeling control of medication • Feeling comfortable to talk about my medication • Not to skip medicine due to improper medicine restocking system
5	**Business Model (Revenue Model)** • Growth opportunities • Economical development • Uncomplicated interface • Feeling proud for saving many lifes

6	**Scalability of the Solution** • Better interaction with user • Immediate response for customer queries • Reduce user's worry about this medication • User friendly • 24 x 7 support • Personalization

3.4 PROBLEM SOLUTION FIT



4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

Following are the functional requirements of the proposed solution

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through form
FR-2	Medicine Registration	Registration through Form All the information will be saved in the database.
FR-3	Set Alarm	Set alarm for medicine timings It helps in reminding about the medicines.
FR-4	Get Notification	Once the medicine timing is reached user will get a notification
FR-5	Medicine Removal	If the user is recovered from disease he can remove the medicine details
FR-6	Feedback	User can give the feedback about our application

4.2 NON-FUNCTIONAL REQUIREMENTS

Following are the non-functional requirements of the proposed solution

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Medicine reminders serve as a good way to stay on track and uphold an appropriate schedule. reminder to take medicines and help prevent double doses..
NFR-2	**Security**	Warfarin is one of the most common causes of medication-related hospitalizations in older adults. To reduce the risk of serious problems, one may need to apply extra care in monitoring warfarin effect and extra care in checking for interactions when a new drug is prescribed.
NFR-3	**Reliability**	The older you get, the more likely you are to use additional medicines, which can increase the chance of harmful side effects, including interactions. And, as you age, physical changes can affect the way medicines are handled by your body, leading to potential complications
NFR-4	**Performance**	These apps offer simple and user-friendly functionality enabling quick scheduling.
NFR-5	**Availability**	Often it happens that patients end up taking the wrong medication or skip dosages. However, the pill reminder apps offer automatic reminders helping the patients to stick to their schedules.
NFR-6	**Scalability**	These apps offer flexibility for customizing the schedule according to the requirement for each medication

5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAM

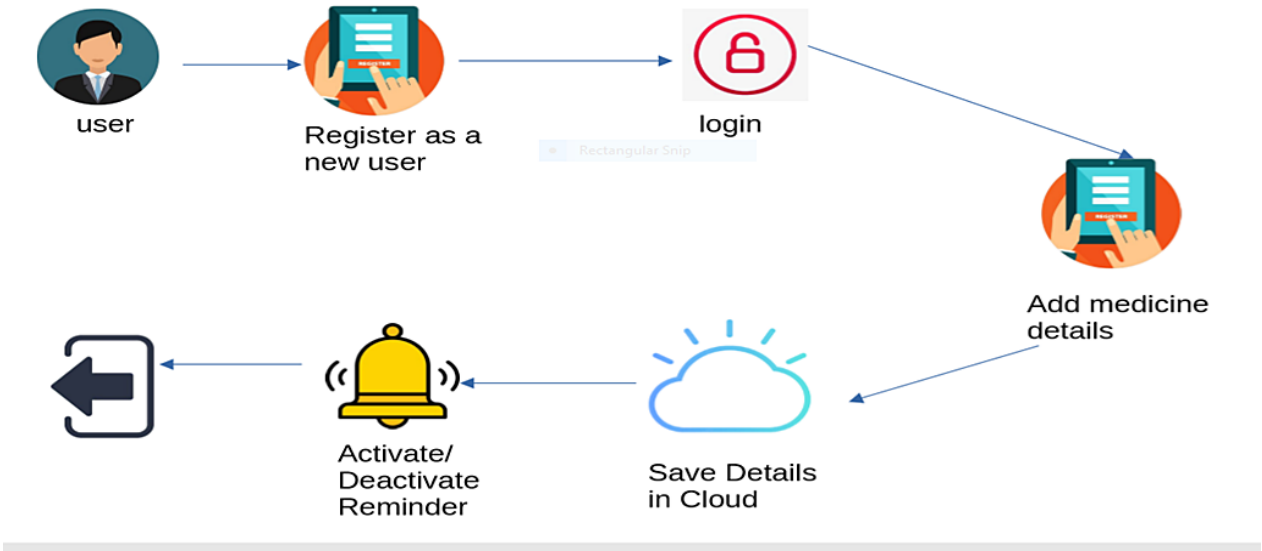
- DFD is the abbreviation for Data Flow Diagram

• The flow of data of a system or a process is represented by DFD.

• It also gives insight into the inputs and outputs of each entity and the process itself

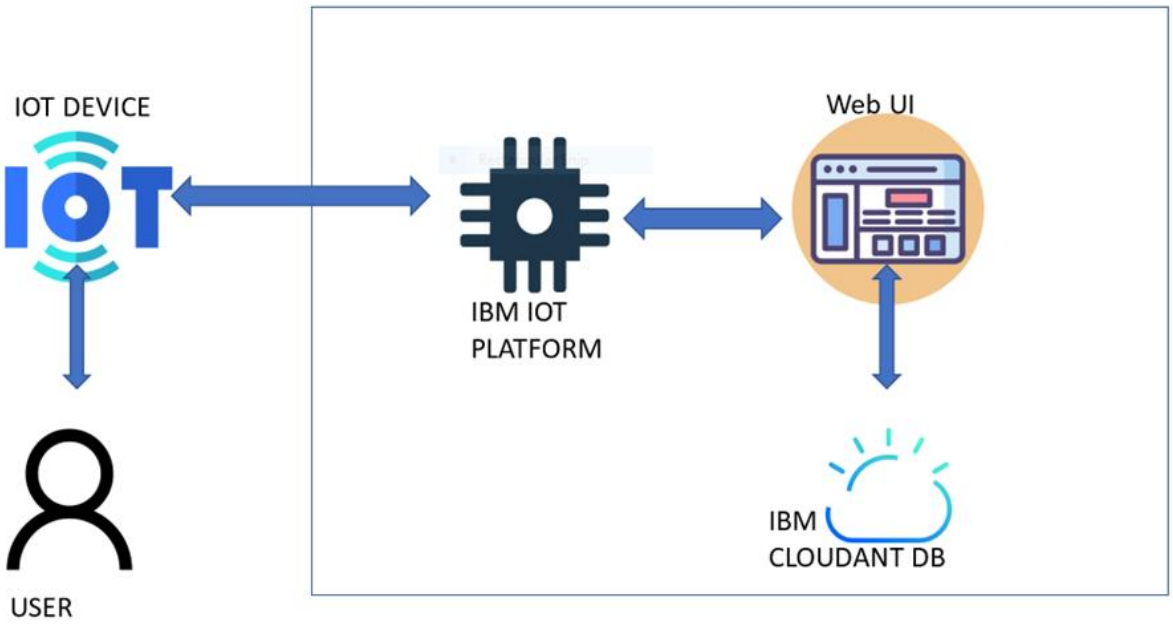
• DFD does not have control flow and no loops or decision rules are present

• Specific operations depending on the type of data can be explained by a flowchart.



5.2 SOLUTION AND TECHNICAL ARCHITECTURE

SOLUTION ARCHITECTURE



TECHNICAL ARCHITECTURE

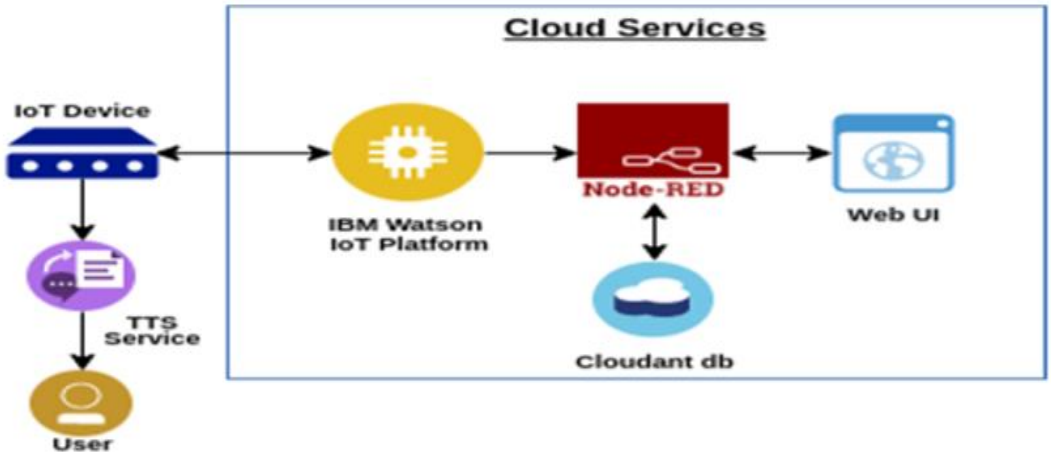


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Mobile App	MIT

2.	Application Logic-1	Gathering medicine details and check the timings	Python
3.	Application Logic-2	alarms	IBM Watson
4.	Cloud Database	Database Service on Cloud	IBM Cloudant DB

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Mobile application development,iot setup,programming the iot device,text to speech service,storing details in cloud	Mit,ibm watson,node red,ibm cloud
2.	Security Implementations	Implementing encryption for security purpose	SHA-256.
3.	Scalable Architecture	Application is able to load as many members as logged in	Mit,ibm watson
4.	Availability	Application is available 24/7	Mit,ibm watson,node red,ibm cloud
5.	Performance	Reminder with correct timing	Ibm watson,ibmiotf

5.3 USER STORIES

User Type	Functional Requirement	User Story Number	User Story/task	Acceptance Criteria	Priority	Release
User	Register User	USN-1	User can register themselves as a user	New user account is created	medium	sprint1
User	Login	USN-2	User login to the app	Going to the dashboard	medium	sprint2
User	Add Medicine Details	USN-3	User add his/her medicine details	Added medicine details successfully	high	sprint3
User	Activate/ Deactivate Reminder	USN-4	User activate/deactivate medicine reminder	Activated/ Deactivated successfully	high	sprint4
User	Logout	USN-5	User logout from the app	Logout the user	low	sprint4

6.PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

Sprint	Functional Requirement	User Story Number	User Story/Task	Story Points	Priority	Team Members
Sprint 1	Register User	USN 1	User can register themselves as a new user	3	medium	4
Sprint 2	Login	USN 2	User login to the app	4	medium	4
Sprint 3	Add medicine Details	USN 3	User add his/her medicine details	10	high	4
Sprint 4	Activate/ Deactivate Reminder	USN 4	User activate/ deactivate medicine reminder	10	high	4
Sprint 4	Logout	USN 5	User logout from the app	3	low	4

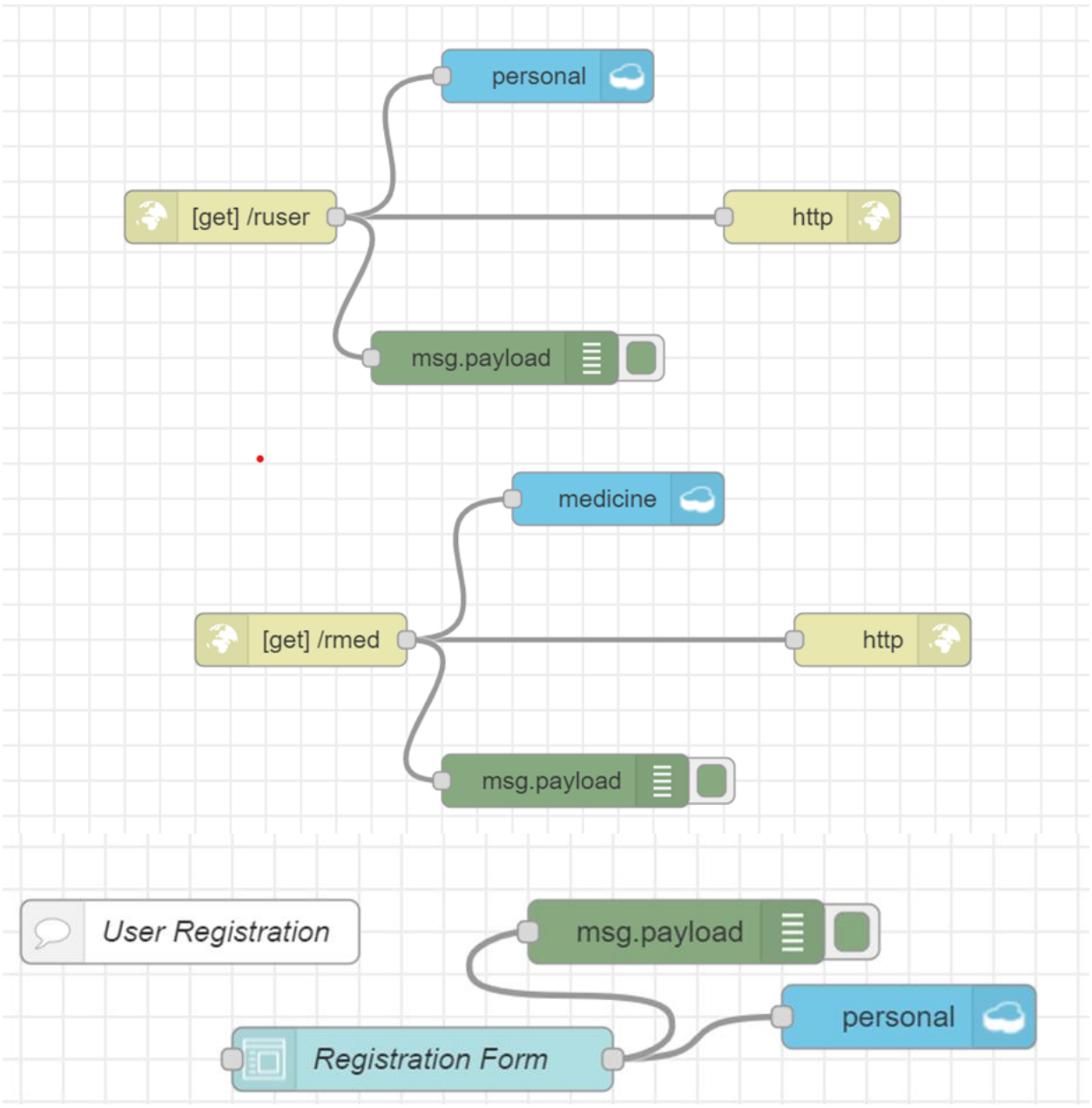
6.2 SPRINT DELIVERY SCHEDULE

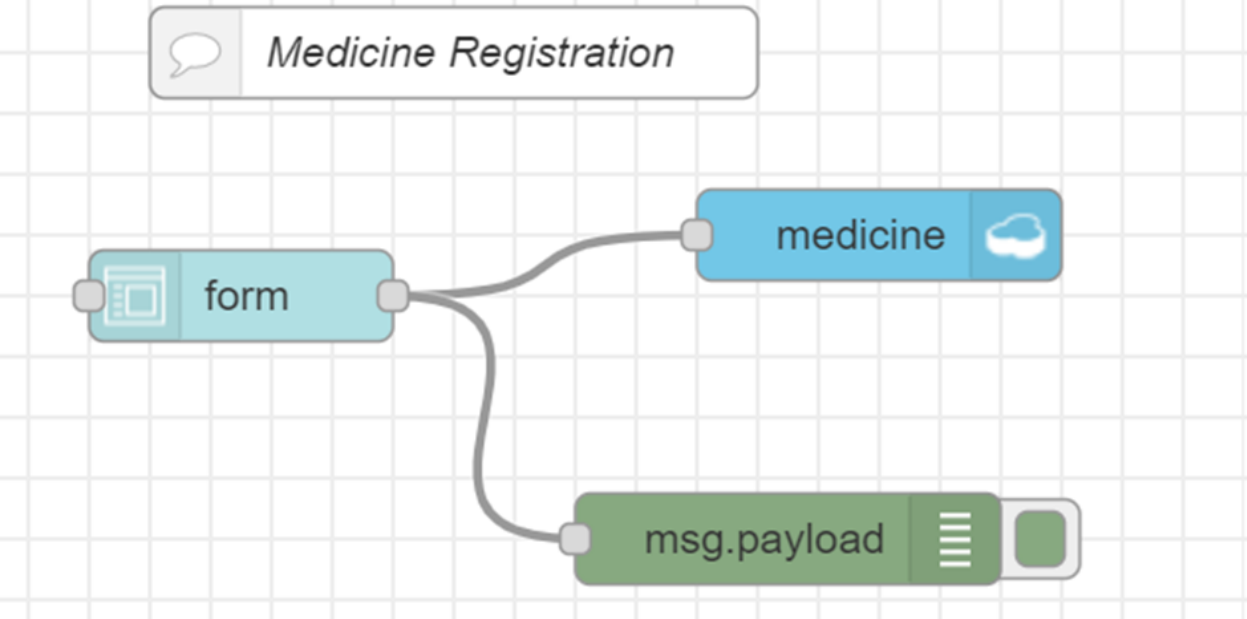
Sprint	Total Story Points	Duration	Sprint Start date	Sprint End date	Story points completed date	Sprint Release date
Sprint 1	3	7 days	25 Oct 2022	1 Nov 2022	28 Nov 2022	30 Nov 2022
Sprint 2	4	7 days	2 Nov 2022	9 Nov 2022	7 Nov 2022	8 Nov 2022
Sprint 3	10	7 days	10 Nov 2022	17 Nov 2022	16 Nov 2022	17 Nov 2022
Sprint 4	13	7 days	18 Nov 2022	25 Nov 2022	19 Nov 2022	19 Nov 2022

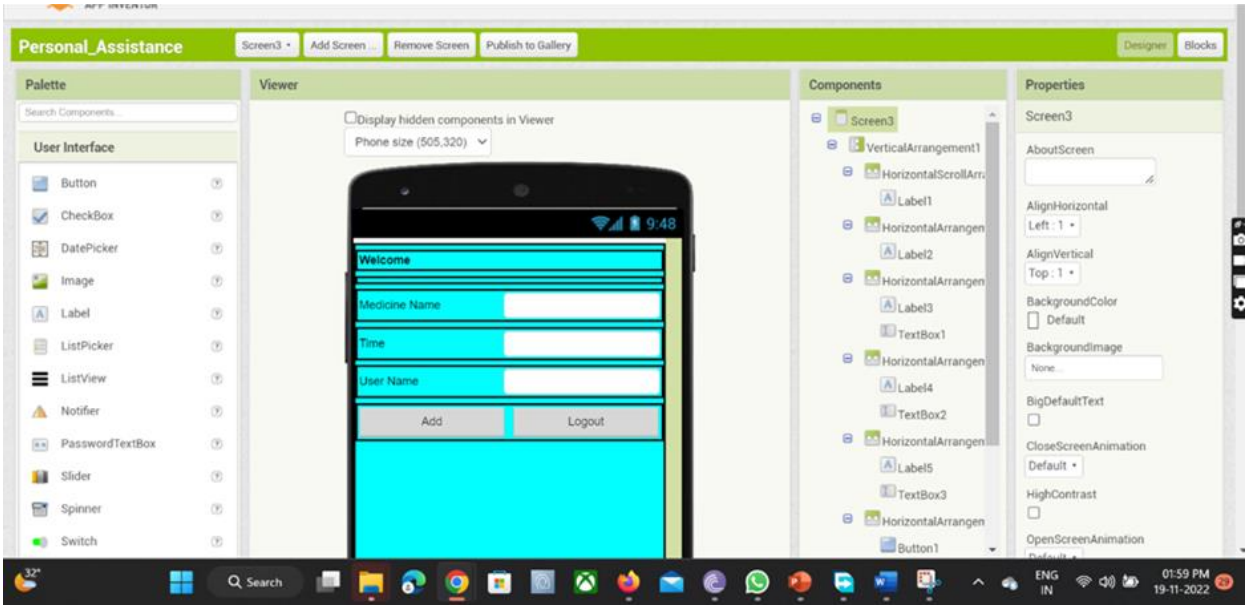
7.CODING AND SOLUTIONING

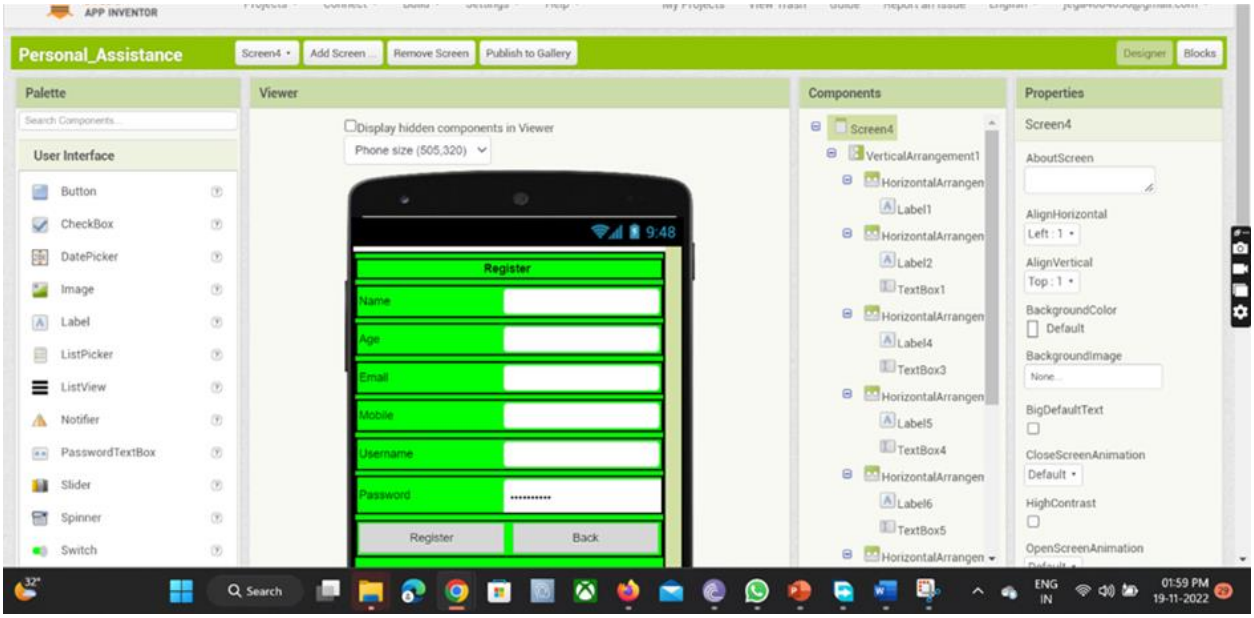
7.1 FEATURE 1

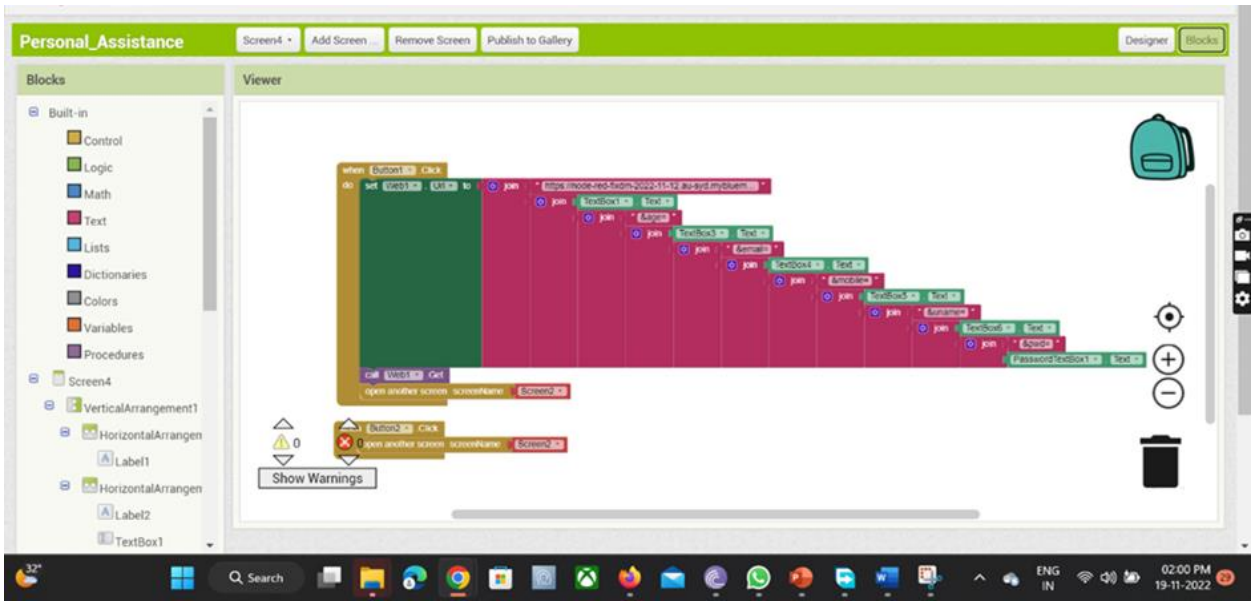
storinf details via mobile apk, web UI


personal
[get] /ruser
http
msg.payload
medicine
[get] /rmed
http
msg.payload
User Registration
msg.payload
personal
Registration Form

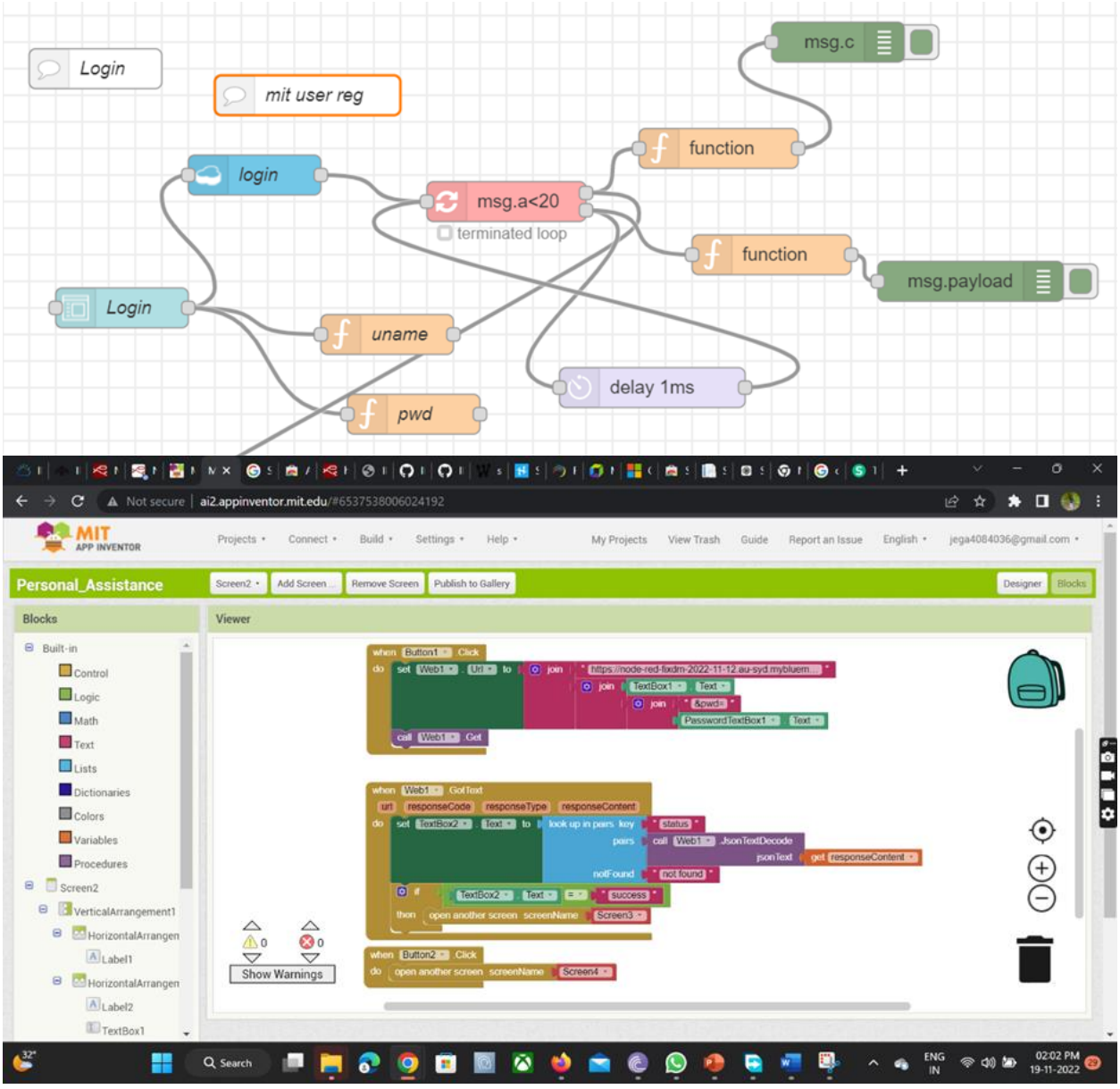

Medicine Registration
medicine
form
msg.payload


Personal_Assistance
Screen3
Add Screen
Remove Screen
Publish to Gallery
Designer
Blocks
Palette
User Interface
Button
CheckBox
DatePicker
Image
Label
ListPicker
ListView
Notifier
PasswordTextBox
Slider
Spinner
Switch
Viewer
Display hidden components in Viewer
Phone size (505,320)
9:48
Welcome
Medicine Name
Time
User Name
Add
Logout
Components
Screen3
VerticalArrangement1
Label1
Label2
Label3
TextBox1
Label4
TextBox2
Label5
TextBox3
Button1
Properties
Screen3
AboutScreen
AlignHorizontal
Left : 1
AlignVertical
Top : 1
BackgroundColor
Default
BackgroundImage
None...
BigDefaultText
CloseScreenAnimation
Default
HighContrast
OpenScreenAnimation
Search
ENG
IN
01:59 PM
19-11-2022





Login via both mobile apk and web ui



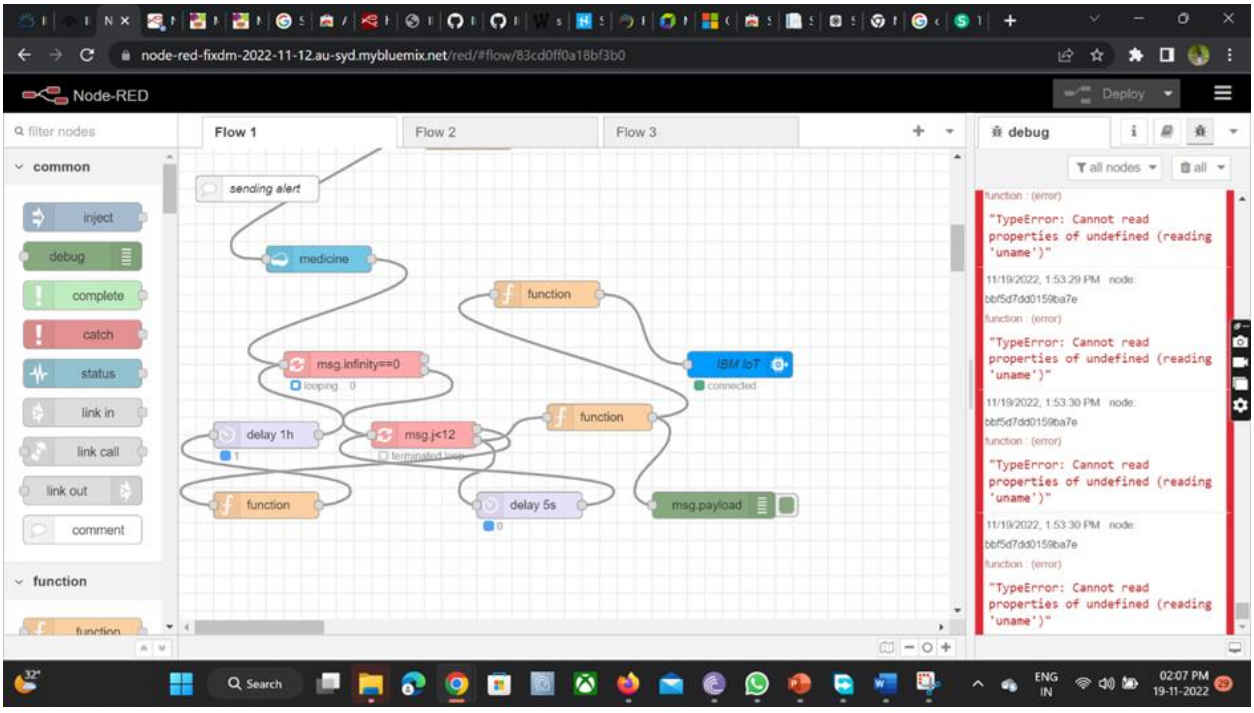
Login code:

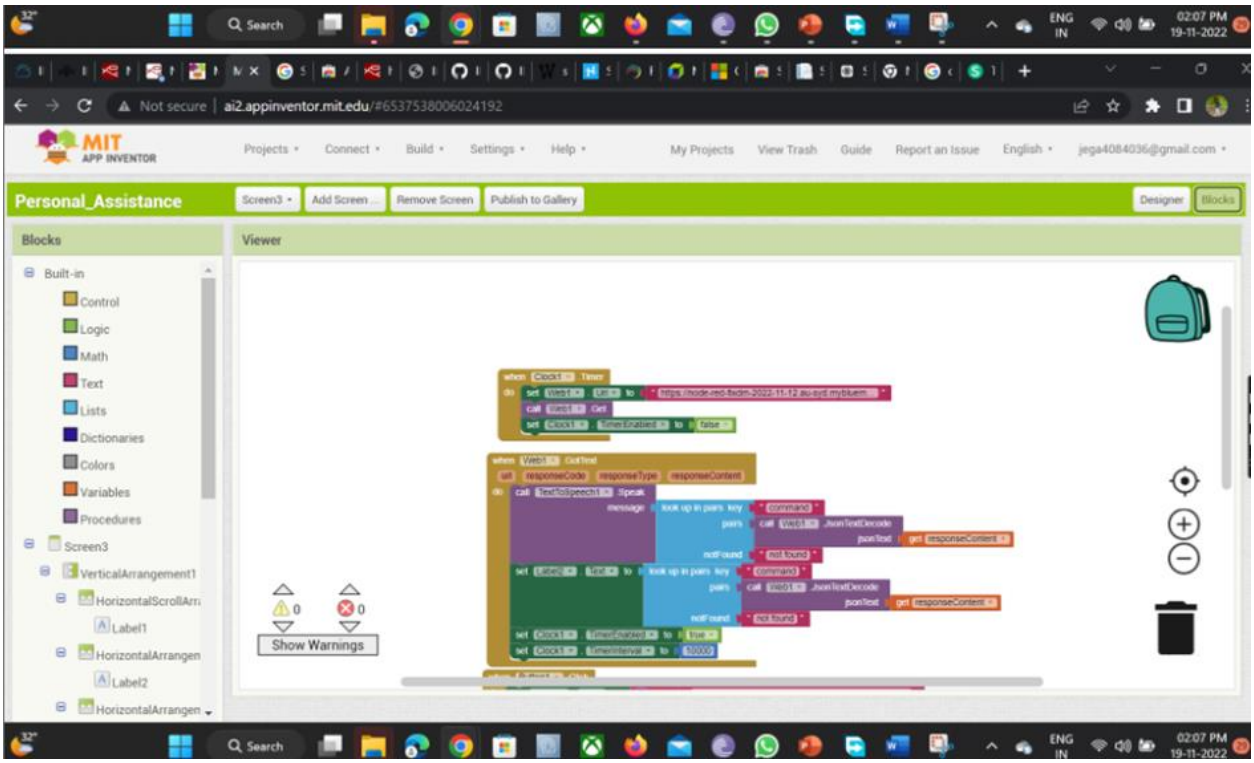
```
msg.b=global.get("uname");
msg.f=global.get("pwd");
var i=msg.a;
msg.uname=msg.payload[i].uname;
msg.uname=msg.payload[i].pwd;
if(msg.uname === msg.b){
```

```
if(msg.pwd === msg.f){
    global.set("status","success");
}
}
return msg;
```

7.2 FEATURE 2

Sending alert via mobile apk,webui,iot





Alert code in Node red

```
var date=new Date();
var hour =date.getHours();
var i=msg.j;
msg.uname1=global.get("uname");
msg.uname=msg.payload[0].uname;
global.set("mname",msg.payload[0].mname);
msg.in=parseInt(msg.payload[0].time);
msg.payload=global.get("mitmedicine");
if(msg.in===hour){
    if(msg.uname===msg.uname1){
        msg.alert1="equal";
```

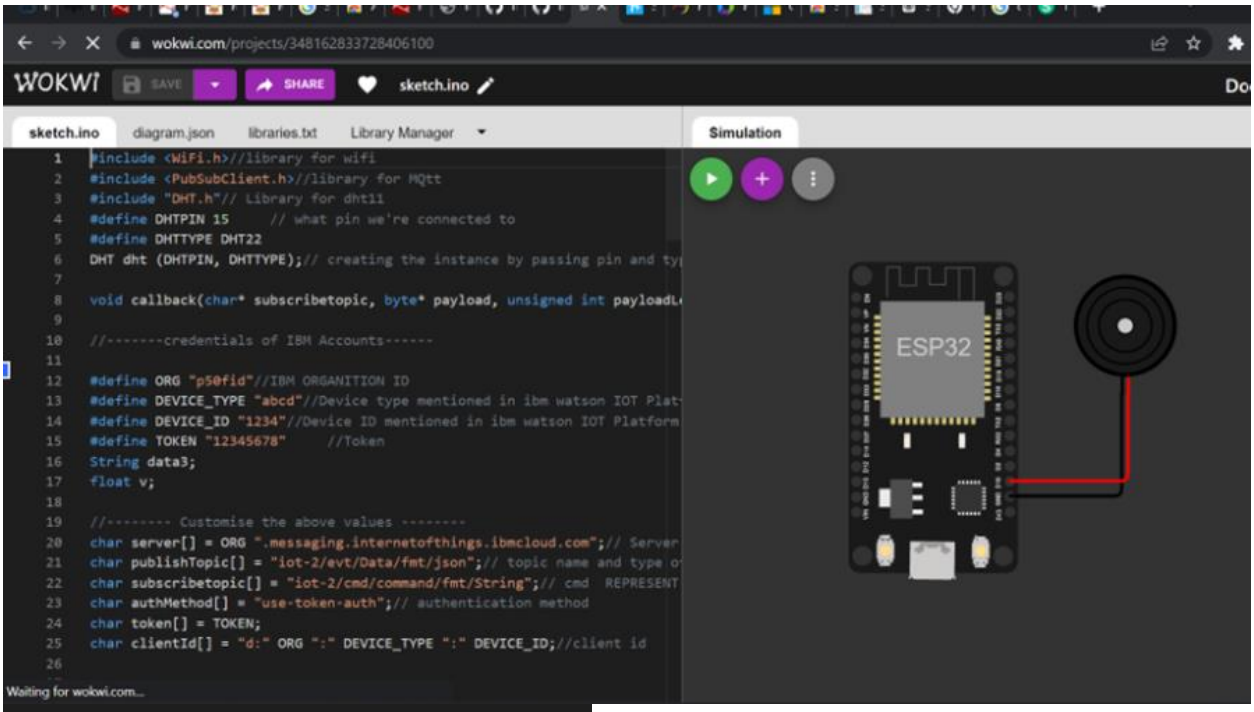
msg.alert="hello "+msg.uname1+" its time to take "+global.get("mname") ;

global.set("mitmedicine",msg.alert);

}

}

return msg;




```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include "DHT.h"// Library for dht11
#define DHTPIN 15     // what pin we're connected to
#define DHTTYPE DHT22
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 "p50fid"//IBM ORGANITION ID
#define DEVICE_TYPE "abcd"//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "1234"//Device ID mentioned in ibm watson IOT Platform
```

```
#define TOKEN "12345678"      //Token
String data3;
float v;

//-------- 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

//-----------------------------------------
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() {

  pinMode(DHTPIN, OUTPUT);
  wificonnect();
  mqttconnect();
}

void loop() {
  wificonnect();
  mqttconnect();
  v = 32;
  Serial.print("volume:");
  Serial.println(v);
  tone(DHTPIN, v);
  delay(1000);
  PublishData(v);
  noTone(DHTPIN);
  delay(1000);
  if (!client.loop()) {
    mqttconnect();
  }

}
void PublishData(float volume) {
  mqttconnect();//function call for connecting to ibm
  /*
     creating the String in in form JSon to update the data to ibm cloud
  */
  String payload = "{\"volume\":";
```

```
  payload += volume;
  payload += "}";


  Serial.print("Sending payload: ");
  Serial.println(payload);


  if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok");// if it sucessfully upload data on the
cloud then it will print publish ok in Serial monitor or else it will
print publish failed
  } else {
    Serial.println("Publish failed");
  }

}
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() {
```

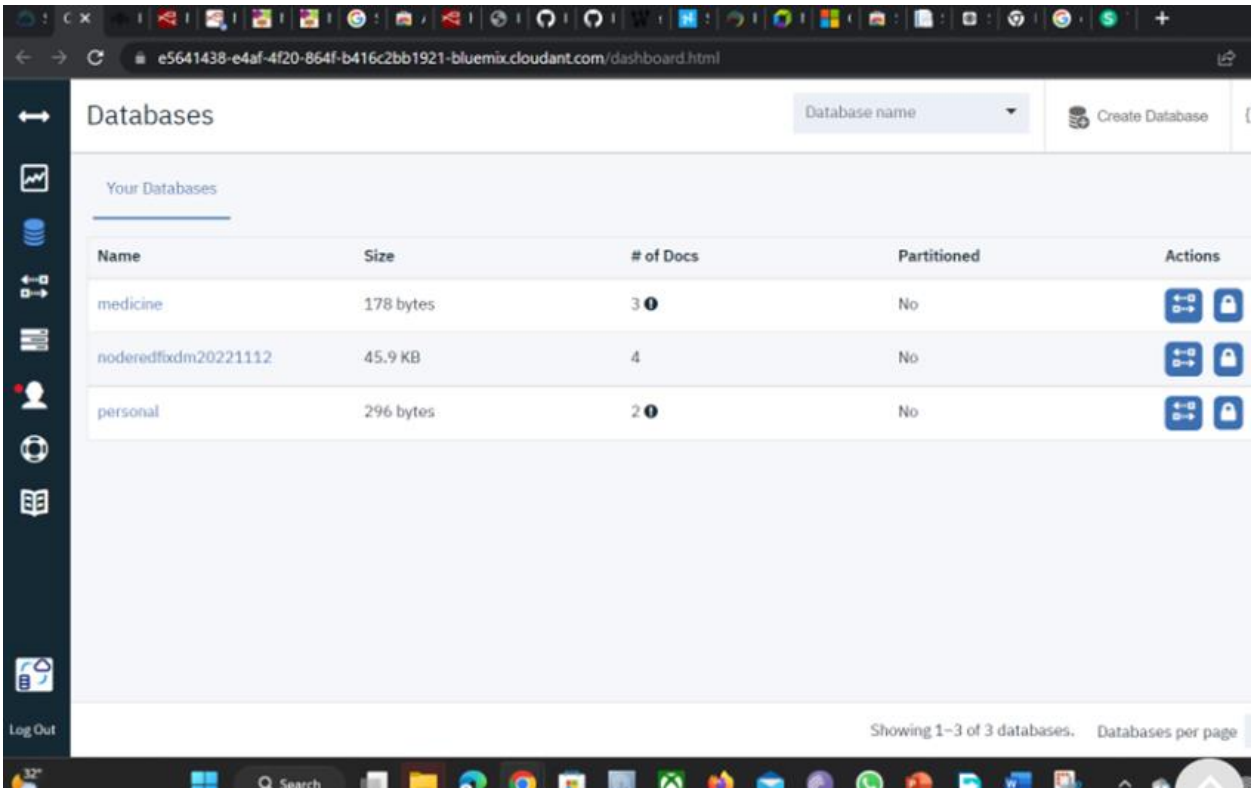
```
  if (client.subscribe(subscribetopic)) {
    Serial.println((subscribetopic));
    Serial.println("subscribe to cmd OK");
  } else {
    Serial.println("subscribe to cmd FAILED");
  }
}

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=="alert")
  {
  Serial.println(data3);
  tone(DHTPIN,32);
  delay(100);
  noTone(DHTPIN);
  }
  else
  {
    noTone(DHTPIN);
  }
data3="";
}
```

7.3 Feature 3

Cloudant DB



8.TESTING

8.1 TEST CASES

Test case	Precondition	Test steps	Test data	Expected result
Verify login with valid credentials	User should have a network connection	1. Launch URL 2. Enter valid username. 3. Enter valid password. 4. Click on the "Login" button.	Username: Priya 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: Priya Password: priya123	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: Cetirizine Medicine Time: 20.00	Users should be able to update it successfully.

8.2 USER ACCEPTANCE TESTING

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the Personal Assistance for seniors who are self reliant project at the time of the release to User Acceptanc

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	9	4	2	3	20
Duplicate	1	0	0	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Registration	7	0	0	7
Login	10	0	0	10
Reminder	51	0	0	51
Mobile apk registration	3	0	0	3
Mobile apk login	9	0	0	9
mobile apk reminder	4	0	0	4
IOT reminder	10	0	0	10

9.RESULT

9.1 PERFORMANCE METRICS

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

ADVANTAGES AND DISADVANTAGES

ADVANTAGES

- My health issues under my control
- Live independently and happy
- Remember tasks in daily life
- Find confident in filled detail for alert by getting it verified
- Feeling control of medication

DISADVANTAGES

- Health is not as good as before worry about accidents
- Memory loss,forgetting to complete task
- Uneasy access to caregiver
- Poor organization of storing medicine
- Lowering of charge on devices

CONCLUSION

Inputs to the app include capturing the number of pills,size ,color and when to take the pills in memory. Adding to this, the time and date for the dosage is loaded too. The system helps the user to set the time of dosage which will help to dispense multiple medicines at a particular schedule. The

notifications are intendedto remind the user about medicine in voice commands. Get an alert that my medication is low.Looking up reviews on certain medicine before taking them.This system is useful not only for the normal people but also for disabled people.

FUTURE SCOPE

- Better way to organize multiple pills
- To get update on my family's medication track
- Looking up reviews on certain medicine before taking them
- Taking medicine in daily basis
- Feeling control of medication
- An app has better interaction with user
- Reduce user's worry about his/her medication
- Not to skip medication due to improper medicine restocking system
- Get an alert when medication is slow
- 24 x 7 support
- Feeling proud for saving many lives
- Live independently and happily

APPENDIX

SOURCE CODE

Login code:

```
msg.b=global.get("uname");

msg.f=global.get("pwd");

var i=msg.a;

msg.uname=msg.payload[i].uname;

msg.uname=msg.payload[i].pwd;
```

```
if(msg.uname === msg.b){
if(msg.pwd === msg.f){
   global.set("status","success");
}
}
return msg;
```

Alert code in Node red

```
var date=new Date();
var hour =date.getHours();
var i=msg.j;
msg.uname1=global.get("uname");
msg.uname=msg.payload[0].uname;
global.set("mname",msg.payload[0].mname);
msg.in=parseInt(msg.payload[0].time);
msg.payload=global.get("mitmedicine");
if(msg.in===hour){
   if(msg.uname===msg.uname1){
      msg.alert1="equal";
      msg.alert="hello "+msg.uname1+" its time to take
"+global.get("mname") ;
      global.set("mitmedicine",msg.alert);
   }
}
return msg;
```

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include "DHT.h"// Library for dht11
#define DHTPIN 15     // what pin we're connected to
#define DHTTYPE DHT22
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 "p50fid"//IBM ORGANITION ID
#define DEVICE_TYPE "abcd"//Device type mentioned in ibm watson IOT
Platform
#define DEVICE_ID "1234"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "12345678"      //Token
String data3;
float v;

//-------- 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

//-----------------------------------------
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() {

  pinMode(DHTPIN, OUTPUT);
  wificonnect();
  mqttconnect();
}

void loop() {
  wificonnect();
```

```
  mqttconnect();
  v = 32;
  Serial.print("volume:");
  Serial.println(v);
  tone(DHTPIN, v);
  delay(1000);
  PublishData(v);
  noTone(DHTPIN);
  delay(1000);
  if (!client.loop()) {
    mqttconnect();
  }

}
void PublishData(float volume) {
  mqttconnect();//function call for connecting to ibm
  /*
     creating the String in in form JSon to update the data to ibm cloud
  */
  String payload = "{\"volume\":";
  payload += volume;
  payload += "}";


  Serial.print("Sending payload: ");
  Serial.println(payload);


  if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok");// if it sucessfully upload data on the
cloud then it will print publish ok in Serial monitor or else it will
print publish failed
  } else {
    Serial.println("Publish failed");
  }

}
void mqttconnect() {
  if (!client.connected()) {
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     initManagedDevice();
     Serial.println();
  }
```

```
}

void wificonnect() //function defination for wificonnect
{
  Serial.println();
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establish the connection
  while (WiFi.status() != WL_CONNECTED) {
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    Serial.print(".");
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  if(data3=="alert")
  {
  Serial.println(data3);
  tone(DHTPIN,32);
  delay(100);
  noTone(DHTPIN);
  }
  else
  {
    noTone(DHTPIN);
```

```
  }
data3="";
}
```

GITHUB AND DEMO LINK

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-45921-1660733305

DEMO LINK:

https://drive.google.com/drive/folders/149A814jA6bTB3FL0ZplU9Gho-fKGRhHz