

Project Report

Project Title: Personal Assistance for Seniors Who Are Self-Reliant

Team ID : PNT2022TMID19102

Team Size : 4

Team Leader : TALLAPANENI HARISH

Team member : DAMMALA SHANMUKHA AKHIL

Team member : LOGESH BABU

Team member : ABHINASH

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

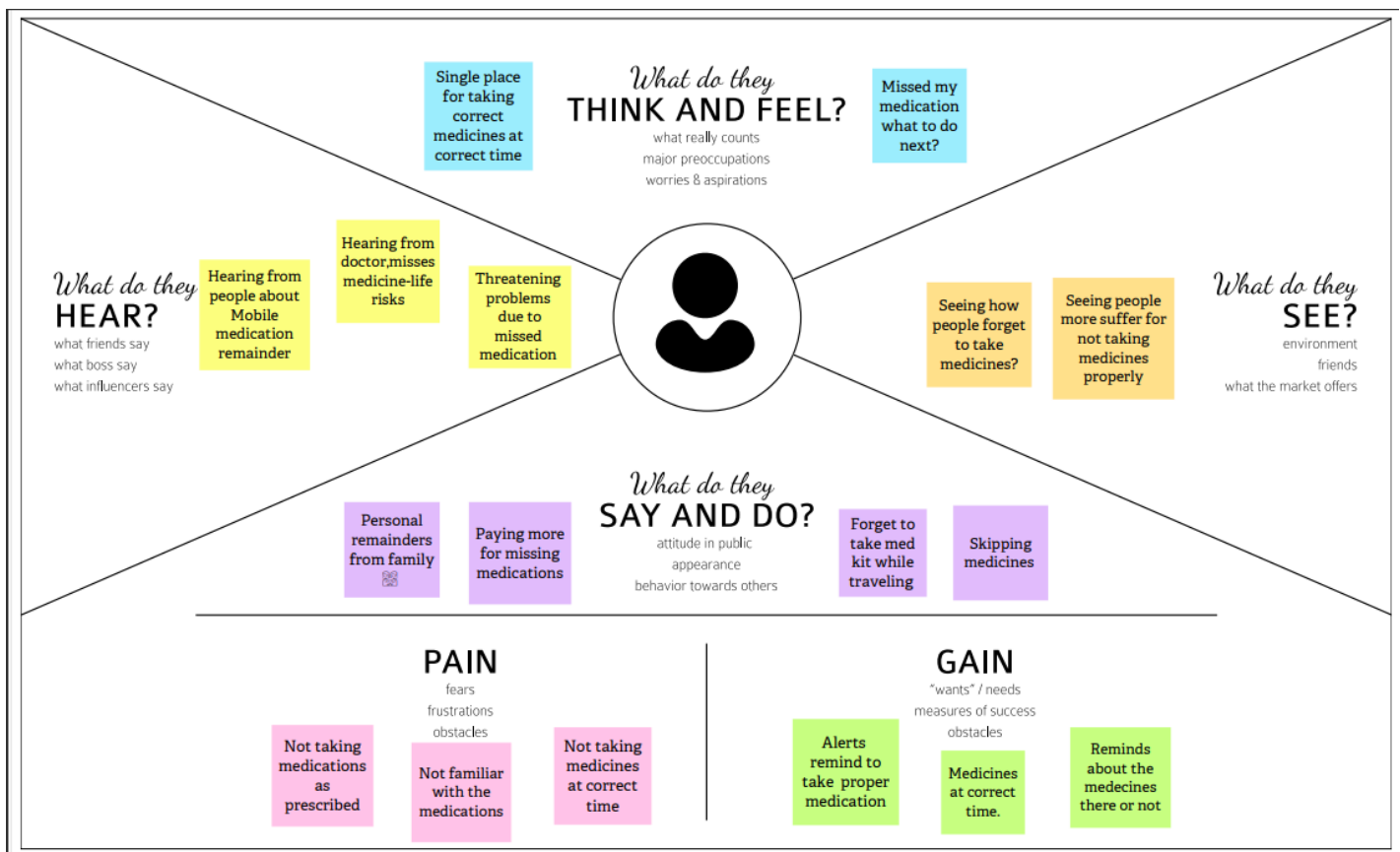
- 1) Visual Health Reminder: A Reminder for Medication Intake and Measuring Blood Pressure to Support Elderly People ; René Baranyi; Sascha Rainer; Stefan Schlossarek; Nadja Lederer; Thomas Grechenig
- 2) Cloud Computing based Medical Assistance & Pill Reminder ; A. Chinnasamy; Ram Prasad J; Syed Rafeeq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

2.3. Problem statement definition

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

3. Ideation and proposed solution

3.1. Empathy Map Canvas



3.2. Ideation and Brainstorming

3.3. Proposed solution

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!

TALLAPATI HARISH

They don't take medicines

Help them to take medicine at right time

Keep track of the checkup dates

Easy to use

Life saving app

DAMMALA SHANMUKHA ARJUN

reminds intake of medicines

right medicines at the right time

simple to manage by senior citizens

occupies minimum memory

easy to design and easily to update

portable

ABHIRASH

User Friendly

Cost Effective

Intact Innovation

No worries about the idios of our family

Prevents life-threatening mistakes

Needs no prior technical knowledge

LODESH

Supports to solve unmet needs

user friendly interface

Maintains digital records

overcomes memory challenges

computerize both manual and complex tasks

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

20 minutes

TIP

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

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Sometimes elderly people forget to take their medicine at the correct time. They also forget which medicine should be taken at that particular time. And it is difficult for doctors/caretakers to monitor the patients around the clock.
2.	Idea / Solution description	<ul style="list-style-type: none"> ➤ A medicine reminder system is developed. An app is built for the user (caretaker) which enables him to set the desired time and medicine. ➤ These details will be stored in the IBM Cloudant DB. If the medicine time arrives the web application will send the medicine name to the IoT Device through the IBM IoT platform.

		<ul style="list-style-type: none"> ➤ The device will receive the medicine name and notify the user with voice commands.
3.	Novelty / Uniqueness	<ul style="list-style-type: none"> ➤ Keeping track of the medicines taken by the user at each time interval. ➤ Information is stored in the secured IBM cloud.
4.	Social Impact / Customer Satisfaction	The reminder system enables the user to take tablets at regular intervals prescribed by the physicians.
5.	Business Model (Revenue Model)	<p>Direct Mode: We gain revenue from selling the medical reminder system to hospitals, medical health centres and even in old age homes.</p> <p>Indirect Mode: We gain profit by having partnership with pharmaceutical companies.</p>
6.	Scalability of the Solution	The medical alert system can be used in hospitals, medical health centres and even in old age homes for dispensing medicines.

3.4. Problem Solution fit

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Project Design Phase-I - Solution Fit Template

Define CS, fit into CC	<div>1. CUSTOMER SEGMENT(S)</div> <div>The customer is old man or women or patient so they are suffering from health issues they don't have the personal care taker to give prescribed medicine on time</div>	<div>6. CUSTOMER CONSTRAINTS</div> <div>The patient is not aware of the medicine because they don't have the knowledge about reading .they forgot to take their medicine on correct time what is the medicine to take how much the amount of medicine to take before food or after food they have lot of problem on that because they don't have the care taker to remain that.</div>	<div>5. AVAILABLE SOLUTION</div> <div>The medicine time arrives through web application will send the medicine name and amount of the medicine to the IOT device that device will receive that and notify to the user with message alerts suppose the message alerts are not working they will notify through message or emergency calls</div>	Explore AS, differential
	<div>2. JOBS-TO-BE-DONE / PROBLEMS</div> <div>Elderly people are forgetful to take their medicine in the correct time so we proposed the solution for this problem. The person will notify to take their medicine in the right time using message alerts</div>	<div>9. PROBLEM ROOT CAUSE</div> <div>Most of the old age people they have multiple medicine to overcome some of the illness . due to take wrong medicine on wrong timing or they don't take medicine at all they can lead to death occur</div>	<div>7. BEHAVIOUR</div> <div>They patient would help from the help option in the web application they can use that if they can face any problem on that</div>	

<div>3. TRIGGERS</div> <div>Friends and family who wish to took after those medically disabled will be encouraged to try this model and to promote this app through advertisement seniors with learning disabilities are may also trigger to use this app.</div>	<div>10. YOUR SOLUTION</div> <div>An web application is build for the user which enables him/her to set the desire time and medicine name to the IOT device. the device will receive the medicine name and notify the user with voice commands</div>	<div>8. CHANNELS OF BEHAVIOUR</div> <div>8.1 ONLINE Upload detils about medicine and get alert message on correct time. 8.2 OFFLINE Patient can directly send a feedback mail or message to the receiver.</div>
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<div>4. EMOTIONS: BEFORE / AFTER</div> <div>They can feel they can take their medicine in correct time and to fell confidentiality and secured.so they, can feel much better than using this app</div>		
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4.Requirement analysis

4.1. Functional Requirements:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Mobile number Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Personal Information	Gathering patient's bio data and medicine history
FR-4	Scheduling	Doctor medicine prescription Doctor's appointment Suggestion of food plan by nutritionist
FR-5	Reminding the medicine timings	Alert the person to take medicine with the correct dosage and medicine name. Remind the doctor's appointment. Remind everyday's diet plan.
FR-6	Emergency alarm	Doctor and caretaker gets the alarm when the person's health is abnormal, which is indicated by heart rate fluctuations or if any fall is detected. Caretaker gets the alarm for the person's missed medicine

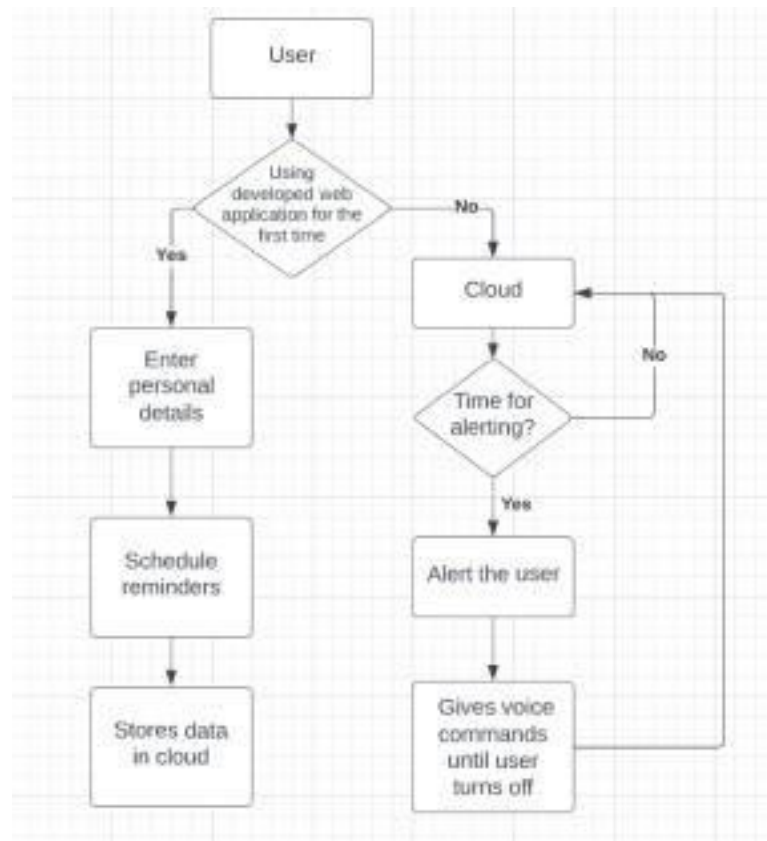
4.2. Non-functional Requirements:

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Caretaker/doctor can easily schedule medicine timings through his/her dashboard.The person can acknowledge the medicine intake using a simple UI.
NFR-2	Security	The person's information is secured by providing access permission only to the corresponding registered caretaker and doctor
NFR-3	Reliability	The application is reliable because of authentication of users and providing database updates regularly.

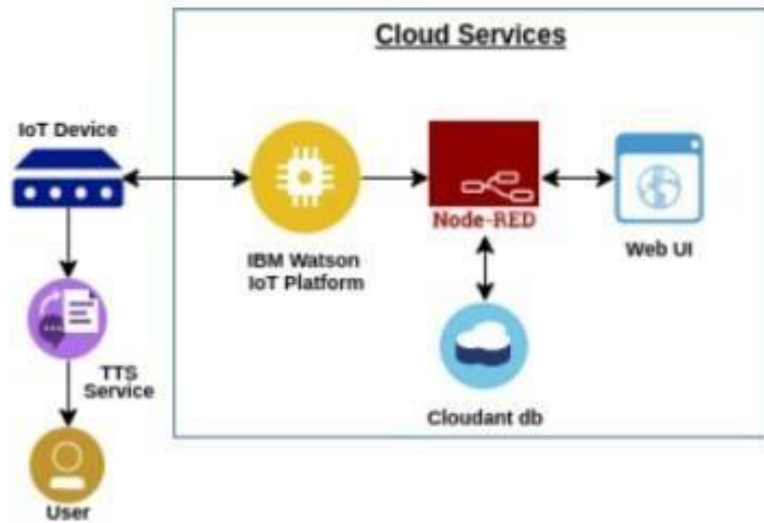
NFR-4	Performance	The application uses virtualsensors, so the performance will be high. The modularization helps in improving the performance of the application
NFR-5	Availability	The services provided are available to the registered users
NFR-6	Scalability	As we are using IBM cloud, our application supports many users at the same time.Hence, it is scalable

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	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Gmail		Medium	Sprint-1
		USN-4	As a user, I can log into the application by entering email & password		High	Sprint-1
	Login	USN-5	As a user, I can set medicine schedules..		High	Sprint-1
	Dashboard	USN-6	As a user, I can update doctor's appointments.		High	Sprint-3
Customer (Web user)		USN-7	As a user, I will receive emergency notification if a senior citizen's health is abnormal	I can contact the senior citizen directly	High	Sprint-3
Customer Care Executive		USN-8	As a user, I can view medicine intake history.		Medium	Sprint-2
		USN-9	As a user, I will receive medicine reminder notification at the scheduled time	I can click confirm.	High	Sprint-2
		USN-10	As a user, I can view medicine intake history		Medium	Sprint-2
Customer(Doctor)	Dashboard	USN-11	I can suggest a diet plan		Medium	Sprint-3

6. Project Planning and Scheduling

6.1. Sprint Planning and Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	IBM Watson IOTplatform	USN-1	Creating devices and board and generating data	1	medium	Tallapane niHarish, Dammala ShanmukhaAkhil, Abhinas h, Logesh
Sprint-2	Storing Data usingnode-red	USN-2	Storing the data in IBM Cloudant DB throughnode-red functions	2	High	Tallapane niHarish, Dammala ShanmukhaAkhil, Abhinas h, Logesh
Sprint-3	IoT device/ Microcontrol lerBoard	USN-4	The board connect with the cloud and retrieve the information and remain the peoples	2	Low	Tallapane niHarish, Dammala ShanmukhaAkhil, Abhinas h, Logesh

Sprint-4	Reminder (TTS)	USN-5	Getting the speech reminder to users to take theirtablet	1	High	Tallapane niHarish, Dammala ShanmukhaAkhil, Abhinas h, Logesh
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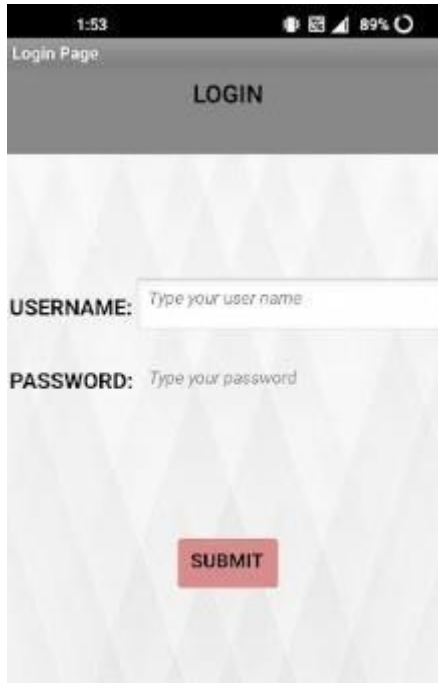
6.2. Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	30 Oct 2022	4 Nov 2022	20	3 Nov 2022
Sprint-2	20	6 Days	5 Nov 2022	10 Nov 2022	20	9 Nov 2022
Sprint-3	20	6 Days	10 Nov 2022	15 Nov 2022	20	14 Nov 2022
Sprint-4	20	6 Days	16 Nov 2022	21 Nov 2022	20	20 Nov 2022

7.Coding and Solutioning

7.1 Feature 1

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



The screenshot shows a mobile application interface for a login page. At the top, the status bar displays the time 1:53, signal strength, and battery level at 89%. The app's title bar is labeled "Login Page". Below the title bar, there is a dark grey header with the word "LOGIN" in white capital letters. The main content 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". Below these fields is a red rectangular button with the word "SUBMIT" in white capital letters.

7.2 Feature 2

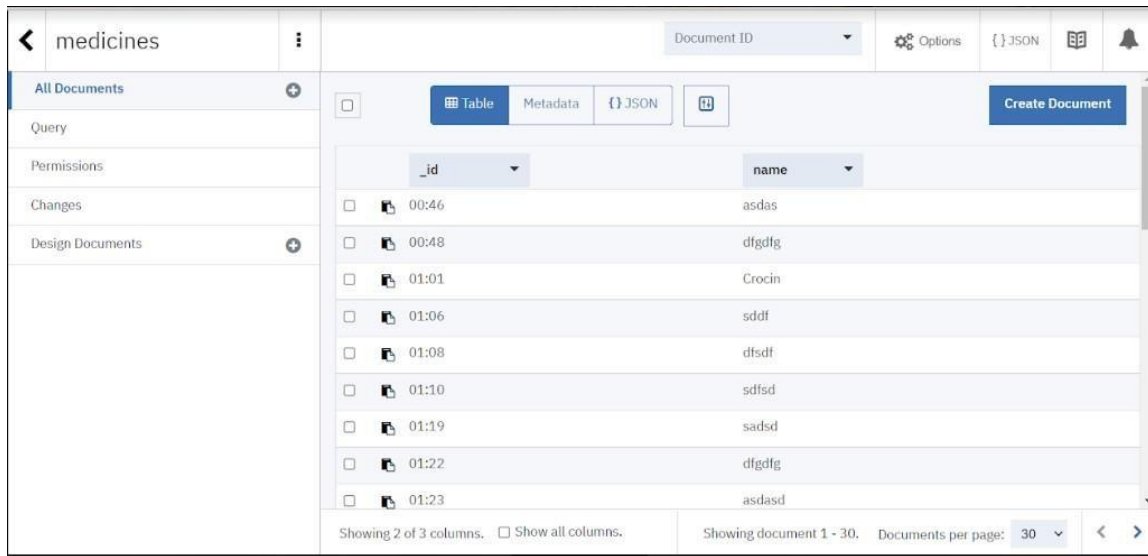
The mobile application also has the feature of uploading medicine names in the cloud.



The screenshot shows a mobile application interface for a "Medicine Details" page. The status bar at the top displays the time 2:00, signal strength, and battery level at 88%. The app's title bar is labeled "Medicine Details". The main content area has a white background. It starts with a "Welcome!!!" message, followed by a prompt "Please enter the medicine name and time below". There are two input fields: "Medicine Name:" with the text "Crocin" and "Medicine Time:" with the text "14:01". Below these fields is a green rectangular button with the word "SUBMIT" in white capital letters. Below the button, the text "Updated Successfully" is displayed. At the bottom, there is a grey rectangular button with the word "Logout" in black capital letters.

7.3. Feature 3

The project includes a cloud database system.



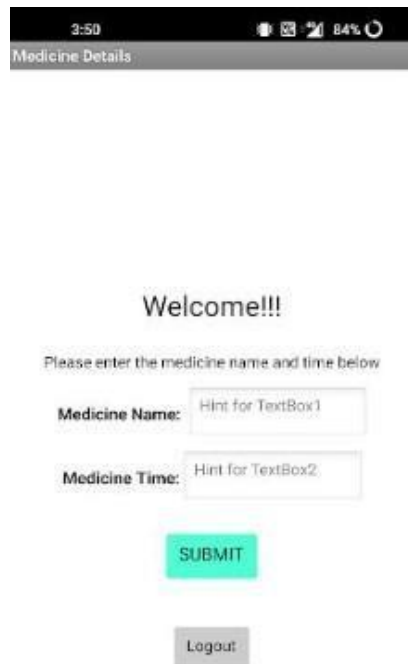
8. Testing

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: Harish 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: Harish Password: Harish123	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

Login page testing



3:50 84%

Medicine Details

Welcome!!!

Please enter the medicine name and time below

Medicine Name:

Medicine Time:

Incorrect login attempt



3:51 84%

Wrong Password

Try again!

Medicine page testing



2:00 88%

Medicine Details

Welcome!!!

Please enter the medicine name and time below

Medicine Name:

Medicine Time:

Updated Successfully

9.Results

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.

10. Advantages and 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:

```
#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(1000);  
  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("data: " + data3);
if(data3=="announce")
{
Serial.println(data3);
for(int i=0;i<5;i++){
DacAudio.FillBuffer();
if(Sound.Playing==false)
    DacAudio.Play(&Sound);
    Serial.println(DemoCounter++);
}
}

else
{
    pass;

}
data3="";

}

```

Github link: <https://github.com/IBM-EPBL/IBM-Project-26657-1660032582>