

Personal Assistance for Seniors Who Are Self-Reliant - Project Report

IBM PROJECT - TEAM ID - PNT2022TMID39645

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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

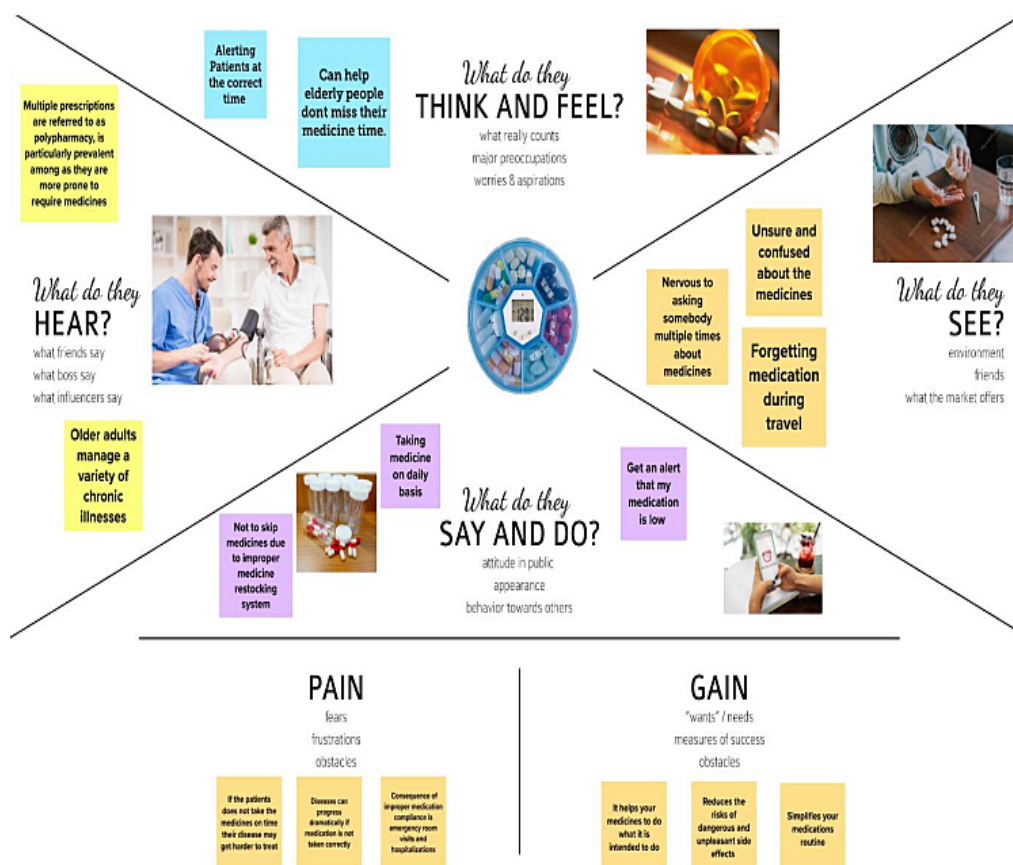
2) Cloud Computing based Medical Assistance & Pill Reminder ; A. Chinnasamy; Ram Prasad J; Syed Rafeeq Ahmed; Akash S

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

2 Brainstorm

Write down any ideas that come to mind that address your problem statement.

15 minutes

Yuvan Shankar

- It is a mobile application to help the patients about the correct time of taking the medicine.
- Patients can make a reminder about the correct time.
- Doctors can send the correct time of taking the medicine.

Ramesh

- Open access to the hospital information system.
- Stock availability alert.
- Unavailability of medicine alert.

Kavi Arasu

- Doctors can send the correct time of taking the medicine.
- Doctors can send the correct time of taking the medicine.
- Doctors can send the correct time of taking the medicine.

Shakeeb Jari Shanavas

- Android based application.
- Doctors can send the correct time of taking the medicine.
- Doctors can send the correct time of taking the medicine.

Udaya Kumar

- Doctors can send the correct time of taking the medicine.
- Doctors can send the correct time of taking the medicine.
- Doctors can send the correct time of taking the medicine.

Gunasekaran

- Doctors can send the correct time of taking the medicine.
- Doctors can send the correct time of taking the medicine.
- Doctors can send the correct time of taking the medicine.

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 can break it up into smaller sub-groups.

20 minutes

Mobile Application

- Sticky notes are sent to the phone numbers of the caregivers.
- Before the medication gets over, text clinic.
- IBM Cloudant Database

Cloud Service

- Open access to the hospital information system.
- IBM Cloudant Database
- Android-based application

Detection

- In a instant situation to notify the patients about the correct time of taking the medicine.
- Stock availability alert

Services

- Assessment of medication being on time.
- Obtain the doctor's correct information if it is available.
- Reminder to make it easy to be precise to take the medication on time.

3.3. Proposed Solution

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. ➤ 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 Satisfaction take tablets at regular intervals prescribed by the physicians.

5.	Business Model (Revenue Direct Mode: We gain revenue from Model)	<p>➤ Direct Mode: We gain revenue from Model) 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:	<p>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.</p>

3.4.Problem Solution Fit



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 Gmail

FR-2	User Confirmation	User Confirmation Confirmation via Email Confirmation via OTP
FR-3	Access Cloud services	Access Cloud services Accessing the cloud service with correct credentials. Storing the details in the cloud database.
FR-4	IOT configuration	IOT configuration Fine Tuning the IOT device based Cloud DB access via device. Manage the data request and response effectively

4.2. Non-Functional Requirements:

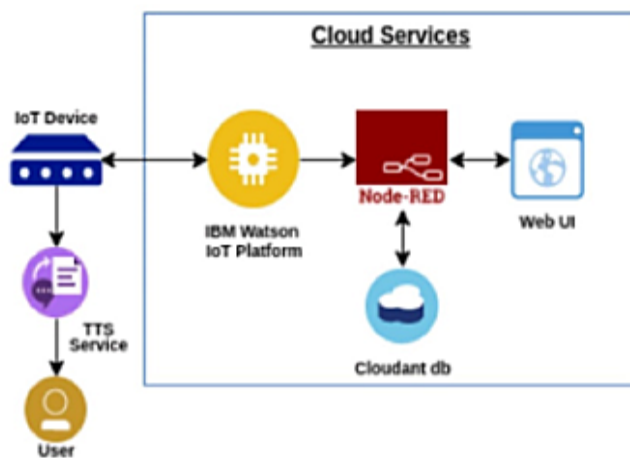
FR No.	Non-Functional Requirement	Description
NF R-1	Usability	App can be used by anyone who has knowledge about applications and computers.
NF R-2	Security	For security, TFA is enabled and biometrics are also added for user safety.
NF R-3	Reliability	Highly reliable since, It use trusted and authentic cloud services like IBM.
NF R-4	Performance	Performance is better compared to other market products.
NF R-5	Availability	Available on mobile App.
NF R-6	Scalability	Using Cloud services, makes the scalability higher than using traditional locally stored 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	USN-1	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	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application.	I can receive confirmation on email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Gmail.		Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email or mobile number & password	I can access my account/dashboard	High	Sprint-1
	Dashboard	USN-5	As a user, I can update my reminders and medicines whenever required.		High	Sprint-2
		USN-6	As a user, I can check the application whether the medicine dosage is completed.		Medium	Sprint-2
Customer Care Executive		USN-7	For any troubleshooting, the user can send a mail to the technical team.		Low	
Administrator		USN-8	Ensures smooth functioning and data warehousing strategies		Medium	Sprint-3

6. Project Planning And Estimation

6.1. Sprint Planning And Estimation

Sprint	Functional Requirement (epic)	User Story/Task	User story/Task	Story Points	Priority	Team Members
Sprint 1	Set Alarm	USN-1	As a user, I can set an alarm to alerting a medicine through medicine remainder system	10	High	Shakeeb Jani Shanavas
Sprint 1		USN-2	As a user, I can Activate and Deactivate the alarm	10	High	Yuvan Shankar
Sprint 1	Notification	USN-3	As a user once I can set the alarm then I gets the notification			Ramesh
Sprint 1		USN-4	As a user If I requires this system then notification will be sent into his device	10	High	Udaya Kumar
Sprint 1	Medication Detail	USN-5	As a user, I have multiple medications each day, it can put each pill in the box for the corresponding day.	10	High	Kavi Arasu
Sprint 1		USN-6	As a user, between setting an alarm and using a pillbox, I'll be able to stay on top of your medications and not miss a dose.	5	Low	Yuvan Shankar, Shakeeb J.S, Kavi Arasu
Sprint 1		USN-7	As a user, I can store the name of the medicine with its description	10	High	Udaya Kumar, Gunasekaran, Ramesh
Sprint 1	GPS Tracking	USN-8	As a user, they can also help large hospitals and clinics manage their inventory more effectively	5	Low	Yuvan Shankar, Udaya Kumar, Kavi Arasu
	Sensor	USN-9	As a user, they used for keeping the record in medicine details the reminding the schedule of medicine. We have used the IoT enabled Arduino device for Monitoring the system	10	High	Shakeeb J.S, Gunasekaran, Kavi Arasu

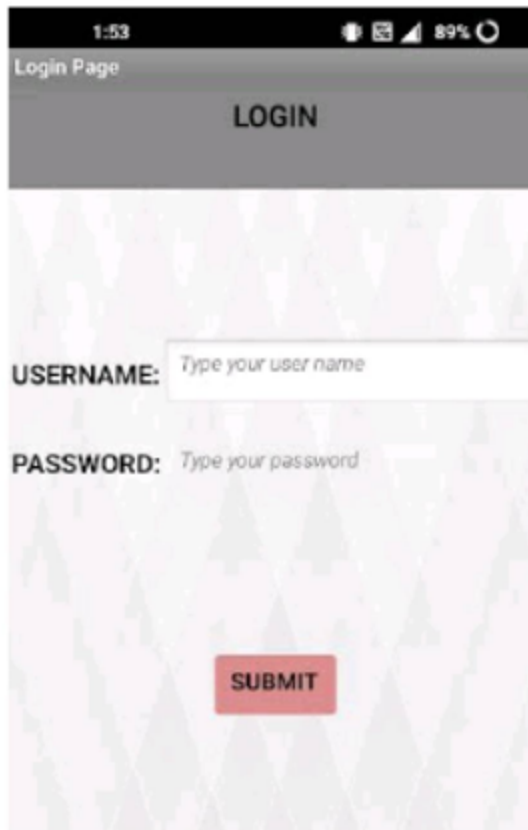
6.2. Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint Start End (planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint 1	20	7 Days	12-11-2022	19-11-2022	20	19-11-2022
Sprint 2	10	4 Days	15-11-2022	19-11-2022	10	19-11-2022
Sprint 3	20	3 Days	16-11-2022	19-11-2022	20	19-11-2022
Sprint 4	10	2 Days	17-11-2022	19-11-2022	10	19-11-2022

7. Coding and Solutioning

7.1. Feature 1

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



1:53 89%

Login Page

LOGIN

USERNAME: Type your user name

PASSWORD: Type your password

SUBMIT

7.2. Feature 2

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

Medicine Details

2:00 88%

Welcome!!!

Please enter the medicine name and time below

Medicine Name: Crocin

Medicine Time: 14:01

SUBMIT

Updated Successfully

Logout

7.3. Feature 3

The project includes a cloud database system.

_id	name
00:46	asdas
00:48	dfgdfg
01:01	Crocin
01:06	sddf
01:08	dfsd
01:10	sdfsd
01:19	sadsd
01:22	dfgdfg
01:23	asdasd

8. Testing

8.1. Test Cases

Test Case	Preconditions	Test Steps	Test Data	Expected Result
Verify login with valid credentials	User should have a network connections	1. Launch Url 2. Enter valid username. 3. Enter valid password. 4.Click on the "Login" button	Username: Shakeeb Password: 12345	Users should be able to login successfully.
Verify login with invalid credentials	User should have a network connections	1. Launch Url 2. Enter valid username. 3. Enter invalid password. 4.Click on the "Login" button	Username: Shakeeb Password: Shak123	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: Cetrizine 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

The screenshot shows a mobile application interface with a status bar at the top displaying '2:00', signal strength, and '88%' battery. Below the status bar is a header 'Medicine Details'. The main content area displays 'Welcome!!!' followed by the instruction 'Please enter the medicine name and time below'. There are two input fields: 'Medicine Name:' with the value 'Crocin' and 'Medicine Time:' with the value '14:01'. Below these fields is a green 'SUBMIT' button. Under the button, the text 'Updated Successfully' is displayed. At the bottom, there is a grey 'Logout' button.

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 spaces)
3.	Revenue	Individual users and pharmaceutical industries.
4.	Efficiency	Simple and straigh forward 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 dependant 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 persons 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 fir MQTT
#include "SoundData.h"
#include "XT_DAC_Audio.h"
```

```

XT_Wav_Class Sound("voice_command.wav");
XT_DAC_Audio_Class DacAudio(2,0);
unit32_t DemoCounter=0;

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

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

#define ORG "ut4tn5" //IBM ORGANIZATION ID
#define DEVICE_TYPE "b11m3edevicetype"//Device type mentioned in IBM Watson IOT
platform
#define DEVICE_ID "b11m3edevicetype_1"//Device ID mentioned in IBM Watson IOT
platform
#define TOKEN "12345678" //Token
String data3;
Float, 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/emd/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() // configuring 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*subscribe,byte*byte*payload,unsigned int payloadLength)
{
    Serial.print("callback invoked for topic:");
    Serial.println(subscribetopic);
    for (int i=0; i<payloadLength;i++){
        //Serial.print((char)payloadLength[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="";
```

```
}
```

14. GITHUB Link

Github : <https://github.com/IBM-EPBL/IBM-Project-17396-1659667342>