

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

## **FINAL REPORT**

**PROJECT TEAM ID : PNT2022TMID38529**

**TEAM MEMBERS : R.ABIRAMI ( TEAM LEADER )**

**S.ABINAYA**

**M.P.MUTHARPAAVAI**

**A.ANUSHYA**

# **CHAPTER 1 INTRODUCTION**

## **1.1 PROJECT OVERVIEW**

The Project concentrates on creating a medicine reminder application.

MedicineReminder Project is a native android application meant to aid forgetful and busy senior citizens by reminding them to take their daily medications. It is designed for users who need a little help keeping track of their medication schedule and who are dedicated to keeping the schedule but forget things easily. The application allows the user to store pill objects and multiple alarms for those pills at the correct times.

## **1.2 PURPOSE**

The objectives of this project are to develop a prototype of a smart medicine reminder for elderly people that helps them consume the medicines right on time.

In recent times, the rate of consumption of medicines has highly increased due to the wide spreading of different diseases and illnesses across the globe. While some diseases are temporary, many diseases have a toll on human health for a lifetime. In the pursuit of maintaining a healthy lifestyle, we often find ourselves to be sick. This could be threatening if not properly treated.

A visit to the doctor and consumption of the medical prescription becomes a necessity. Nevertheless failing to consume the medicine regularly could cause a lot of problems. Keeping in mind this problem, the idea of creating a smart device that alerts the patient to take medicines right on time, so that they would recover soon and stay healthy without any issues in the body.

# **CHAPTER 2 LITERATURE SURVEY**

## **2.1 EXISTING PROBLEM**

The existing methodologies that provide solutions for the specified problem include various gadgets available to assist patients in taking their medication either by simplifying administration or by assisting them in remembering to do so. Pill reminder charts, drug diaries, calendar clocks, telephone prompting services, multi-compartment compliance aids (MCAs), talking labels, voice reminders, watch reminders, daily pill boxes, and automated pill dispensers are just a few examples.

## 2.2. REFERENCES

1. A. Sawand, S. Djahel, Z. Zhang, and F. Na. Multidisciplinary Approaches to Achieving Efficient and Trustworthy e Health Monitoring Systems. Commun.China (ICCC), 2014 IEEE/CIC Int.Conf., pp. 187–192, 2014.
2. D. a. Clifton, D. Wong, L. Clifton, S. Wilson, R. Way, R. Pullinger, and L. Tarassenko. A large-scale clinical validation of an integrated monitoring system in the Emergency Department. IEEE J. Biomed. Heal. Informatics vol. 17, no. 4, pp. 835–842, 2013.
3. M. Parida, H.-C. Yang, S.-W. Jheng, and C.-J. Kuo. Application of RFID Technology for In-House Drug Management System. 15th Int. Conf. Network-Based Inf. Syst., pp. 577–581, 2012.
4. L. Ilkko and J. Karppinen. UbiPILL A Medicine Dose Controller of Ubiquitous Home Environment. 2009 Third Int. Conf. Mob. Ubiquitous Comput. Syst. Serv. Technol., pp. 329–333, 2009.
5. A. Kliem, M. Hovestadt, and O. Kao. Security and Communication Architecture for Networked Medical Devices in mobility-Aware e-Health Environments,” 2012 IEEE First Int. Conf. Mob. Serv., pp. 112–114, 2012.
6. S. T.-B. Hamida, E. Ben Hamida, B. Ahmed, and A. AbuDayya. Towards efficient and secure in-home wearable insomnia monitoring and diagnosis system. 13th IEEE Int. Conf. Bioinforma. Bioeng., pp. 1–6, 2013.

## 2.3 PROBLEM STATEMENT DEFINITION

Tracking the health of a person and proper medication improves their lifetime.

Studies suggest that most of the deaths of senior citizens occur during the night when the person is asleep. Sometimes elderly people forget to take their medicine at the correct time. They also forget which medicine they should take at that time. And it is difficult for doctors/caretakers to monitor the patients around the clock. This work proposes a personal assistant for the elderly or a patient. Personal assistants can provide in-home respite care, allowing family members or caretakers to take a temporary break.

**CHAPTER 3**  
**IDEATION AND PROPOSED SOLUTION**

### 3.1 EMPATHY MAP CANVAS



#### Build empathy

The information you add here should be representative of the observations and research you've done about your users.

#### Says

What have we heard them say?  
What can we imagine them saying?

Spend a lot  
of time  
watching TV

Dislike new  
Tech  
products

Always  
complaining  
of body ache  
and  
loneliness

Complain  
about family  
not spending  
quality time



Old age  
people



#### Thinks

What are their wants, needs, hopes,  
and dreams? What other thoughts  
might influence their behavior?

wish to do  
chores  
independently

wishes to be  
loved and  
cared

loneliness

Forgetting  
things easily

Looking  
weak

Dislike new  
Tech  
products

Spend a lot  
of time  
watching  
TV

Always  
complaining  
of  
loneliness

Scared of  
ailments

Hear friends  
being retired  
from jobs

Fear of  
death as  
they grow  
older

News of  
death of  
friends and  
relatives

#### Does

What behavior have we observed?  
What can we imagine them doing?

#### Feels

What are their fears, frustrations, and  
anxieties? What other feelings might  
influence their behavior?

### 3.2 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The major issue is that elders couldn't remember their medicine consumption due to memory loss and their busy schedules.
2.	Idea / Solution description	Device is made to set reminders for medicine consumption and help people worry less about it.
3.	Novelty / Uniqueness	Unique feature is that it has a voicing system that will act like a mentor for reminding us.
4.	Social Impact / Customer Satisfaction	Customers will be satisfied with this device which will behave like a friend for helping us to do things at the correct time.
5.	Business Model (Revenue Model)	Revenue for this product will be achieved up to our expectations as customer satisfaction suggests, it is been modeled to show up the revenue for the outcome.
6.	Scalability of the Solution	This product can be scaled up to the level of customer satisfaction.

### 3.3 PROPOSED SOLUTION FIT

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

Project Design Phase-I - Solution Fit Template

Team ID: PNT2022TMID15069

Define CS, fit into CC	<b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span> The primary customers are senior citizens but it can be used by anyone.	<b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span> Budget and multi-tasking features associated with the device.	<b>5. AVAILABLE SOLUTIONS</b> <span>AS</span> HABITAT: An IoT solution for Independent Elderly The Smart Home Personal Assistance Device for Independent Senior Citizens	Explore AS, differentiate
	<b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <span>J&amp;P</span> Create timely reminders for taking medicines Providing necessary information about the medicines used by the user	<b>9. PROBLEM ROOT CAUSE</b> <span>RC</span> Increasing amount of nuclear families in the society leaving the senior people with nobody to take care of them everyday.  As age increases, people lose their ability to remember things which makes them forget their daily medicine intake.	<b>7. BEHAVIOUR</b> <span>BE</span> The customer has to add the precise data about the medicines he has to take in various situations	
Identify strong TR & EM	<b>3. TRIGGERS</b> <span>TR</span> Service offered by the assistant as a reminder for their medicine intake Ease of usage offered	<b>10. YOUR SOLUTION</b> <span>SL</span> Personal assistants like our medicine reminder system can provide in-home respite care, allowing family members or caretakers to take a temporary break. An application is built for the user that enables him to set the desired time and medicine. These details will be stored in the IBM Cloudant DB. When the medicine time arrives, the 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. It also has added features for better usage and added benefits.	<b>8. CHANNELS of BEHAVIOUR</b> <span>CH</span> 8.1 ONLINE The customers have to be updated through the data from the application 8.2 OFFLINE The IoT device has to be properly maintained	Identify strong TR & EM
	<b>4. EMOTIONS: BEFORE / AFTER</b> <span>EM</span> Before: Difficulty in remembering to take their medicine on time After: Able to take their dosages properly			

### 3.4 IDEATION AND BRAINSTORMING



#### Brainstorm

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

🕒 10 minutes

#### Shaik Kamiloön

Adding multiple features like stress level monitoring, heart rate and temperature

Enabling voice assistant based services

#### Subhashri K S

Camera associated with the device to read and take inputs of the names of the complex medicine names

Adding music options to make people feel relaxed at times

#### Sofia B

Specifications of the medicine taken before and after food has to be clearly mentioned

An improvement ratio after taking the medicines will be observed

#### Varshinie Sagarikaa MS

Adding a Translator as everyone is not very comfortable with English for voice commands

Providing the importance of the specific drug mentioned



## 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.

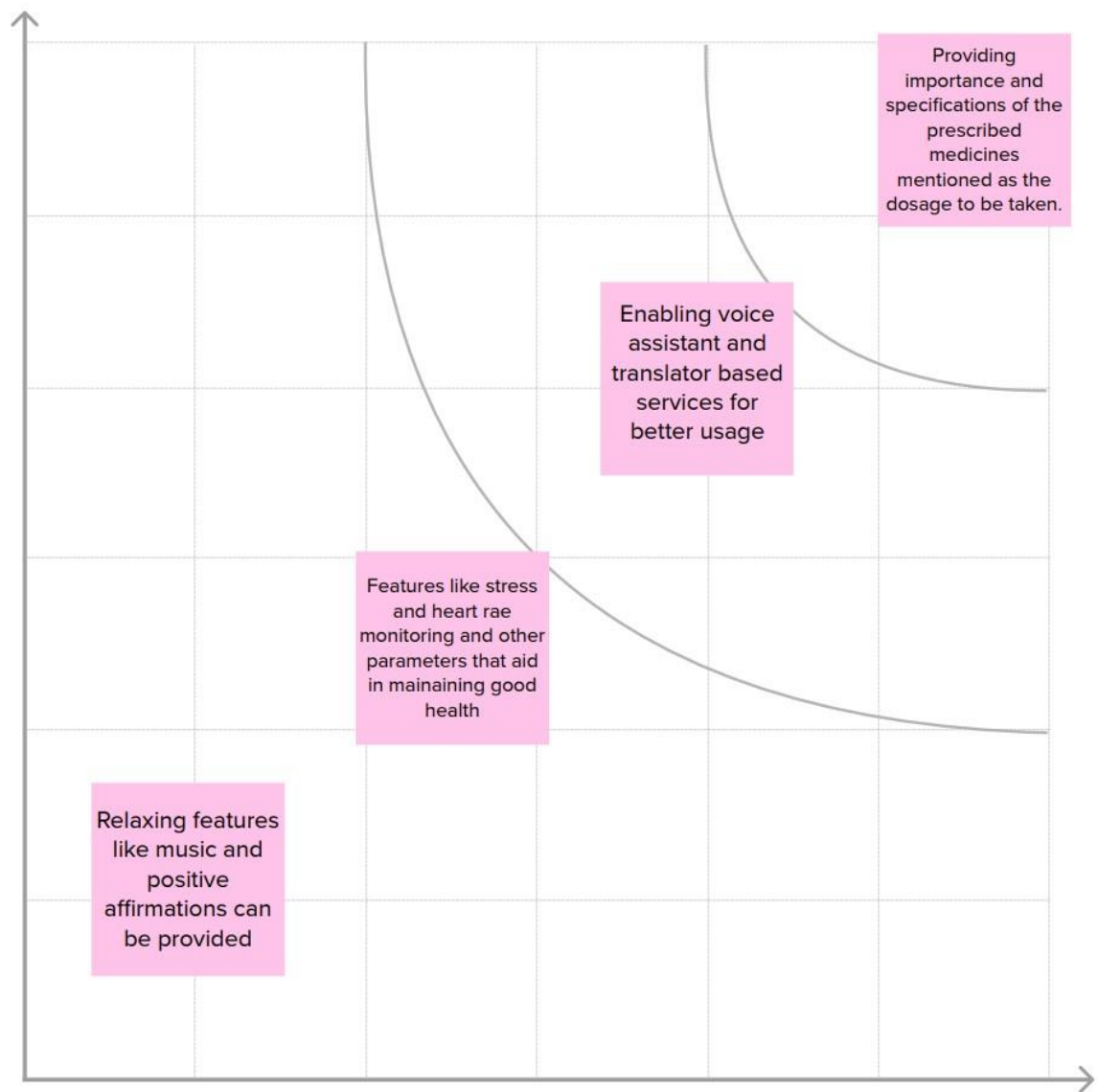
🕒 20 minutes

Providing importance and specifications of the prescribed medicines mentioned as the dosage to be taken

Enabling voice assistant and translator based services for better usage

Relaxing features like music and positive affirmations can be provided

Features like stress and heart rate monitoring and other parameters that aid in maintaining good health



### Feasibility

Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

## CHAPTER 4

### REQUIREMENT ANALYSIS

#### 4.1 REQUIREMENT ANALYSIS

##### 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 Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Access Cloud services	Access the cloud service with correct credentials and store the details in the database. Recover the required information whenever necessary.
FR-4	IOT configuration	Calibration of the IOT device based on preference and Access the Cloud DB via device. Manage the request and response effectively.

**Non-functional Requirements:**

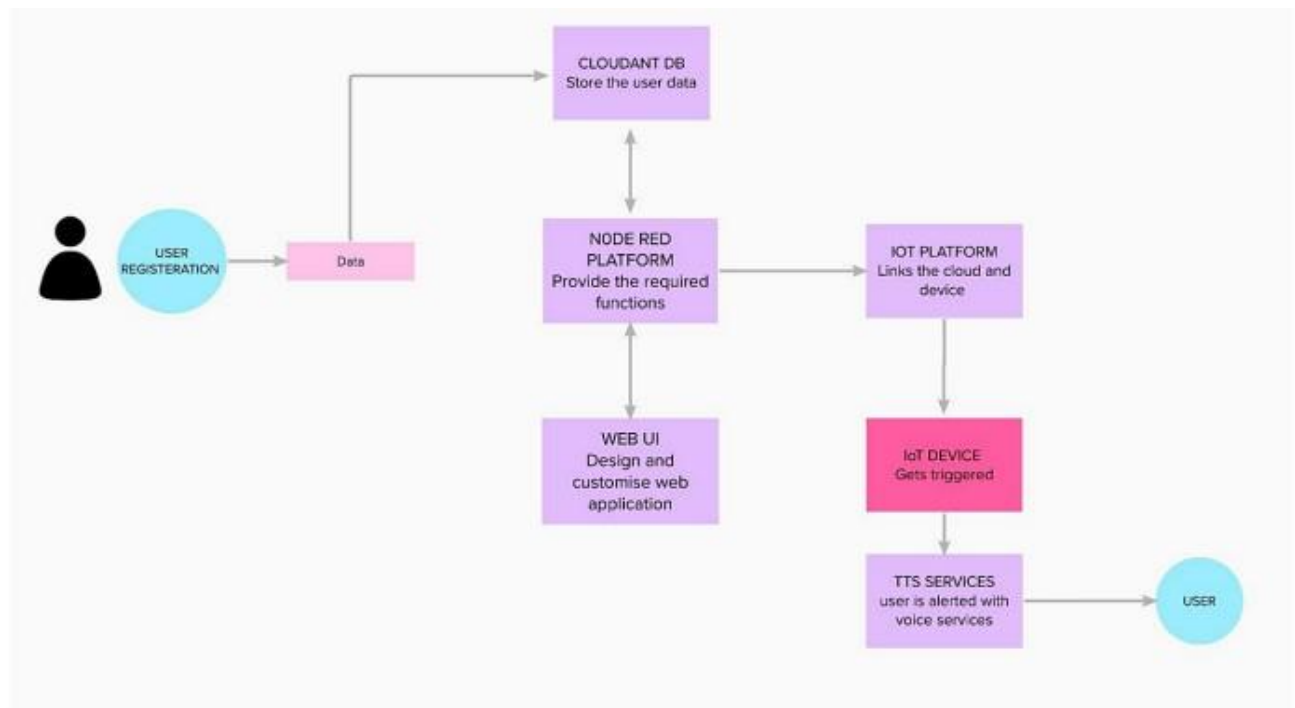
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	<b>Usability</b>	App can be used by anyone who has workable knowledge about internet and computer
NFR-2	<b>Security</b>	For security, TFA (Two Factor Authentication) is enabled along with biometrics for user safety
NFR-3	<b>Reliability</b>	Highly reliable since it uses authentic cloud services like IBM
NFR-4	<b>Performance</b>	Performance is superior compared to other market products.
NFR-5	<b>Availability</b>	Available on mobile app. Web version is on the development phase
NFR-6	<b>Scalability</b>	Using Cloud service, makes the scalability higher using traditional database.

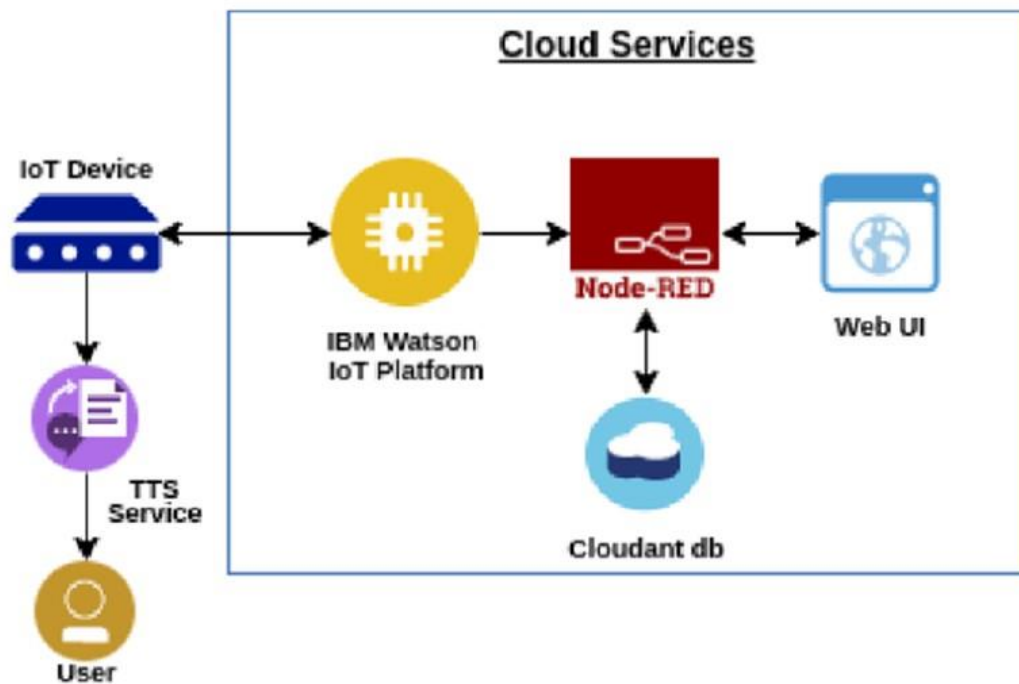
**CHAPTER 5**

# PROJECT DESIGN

## 5.1 DATA FLOW DIAGRAM



## 5.2 SOLUTION AND TECHNICAL ARCHITECTURE



## 5.3 USER STORIES

User Type	Functional Requirement(Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Senior citizen)	Caretaker	USN-1	As a user, I want to take Medicines on time and monitor my health	I want to Take Medicines On time	High	Sprint-1
Customer (Alzheimer patient)	Smart medicine box	USN-2	As a user, I want to take my tablets on time by voice command	I want to take my tablets on time by voice command	High	Sprint-1
Customer (Mentally ill patient)	Caretaker	USN-3	As a user, my patient needs to take medicines on time and monitoring the activity	My patient needs to take medicines on time	Medium	Sprint-2
Customer (Coma patient)	Caretaker	USN-4	As a user, my patient medication time and prescription should load in database for upcoming week	My patient medication time and prescription should be in database list	Low	Sprint-4
Customer (Disabled people's)	Smart medicine box	USN-5	As a user, I need to take my medicine in nearby places with light notification	I need to take my medicine in nearby places with light notification	Medium	Sprint-3

## CHAPTER 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 Mem
Sprint-1	Hardware or Simulation Software	USN-1	Using Wokwi , Connect ESP-32 with UltraSonic Sensor with Python script	2	High	Shaik Kamiloona, Subhashri K S , Varshini Sagarikaa M S, Sofia B
Sprint-2	Cloud Software	USN-2	Create Device in the IBM Watson IOT Platform and link it to Wokwi	2	High	Shaik Kamiloona, Subhashri K S , Varshini Sagarikaa, M S, Sofia B
Sprint-3	Website	USN-3	Create a web application	2	High	Shaik Kamiloona, Subhashri K S , Varshini Sagarikaa M S, Sofia B
Sprint-4	linking	USN-4	Link Device, IBM cloud and the developed application	2	High	Shaik Kamiloona, Subhashri K S, Varshini Sagarikaa, M S, Sofia B

#### CODING AND SOLUTIONING

## CHAPTER 7

### 7.1. FEATURE 1

- IoT Device
- IBM Watson platform
- Node - Red
- Cloudant DB
- Web UI
- Python Code
- Wokwi

### 7.2. FEATURE 2

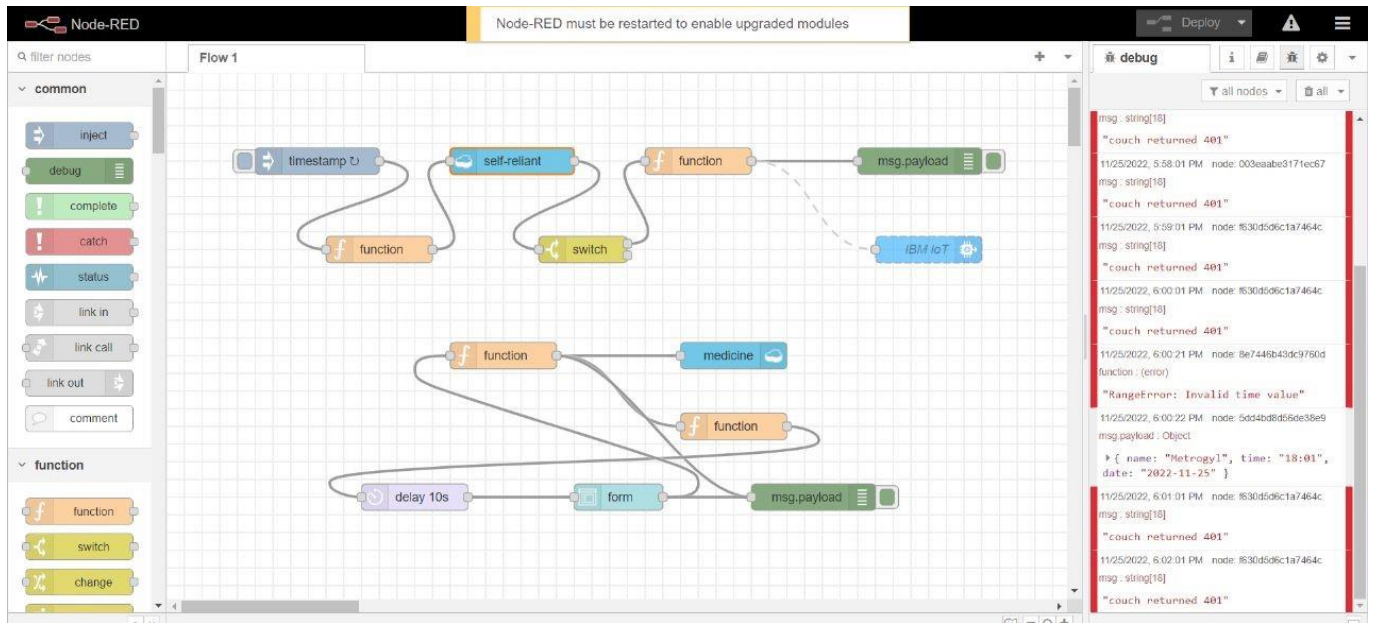
- Login
- MIT Application

## TESTING

After testing the developed code and extensions, the step-by-step observations are listed below.



## CHAPTER 8



### Medicine\_Reminder

#### Medicine\_UI

Enter the Medicine \*

Time (HH:MM) 24Hour Format \*

Date(YYYY-MM-DD) \*

SUBMIT

CANCEL

IBM Watson IoT Platform

111519106141@smartinternz.com  
ID: rjgk4d

Browse Action Device Types Interfaces

Add Device

Search by Device ID

Device Simulator

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
12345	Connected	MyDevice	Device	Nov 21, 2022 11:03 PM	

0 Simulations running

Identity

Device Information

Recent Events

State

Logs

Device ID: 12345

Device Type: MyDevice

Date Added: Nov 21, 2022 11:03 PM

Added By: 111519106141@smartinternz.com

Connection Status: Connected

Connection Time: Nov 25, 2022 6:01 PM

Client Address: 185.178.200.130 Insecure

self\_reliant

Document ID

Options

{ } JSON

Create Document

All Documents

Query

Permissions

Changes

Design Documents

_id	name
2022-11-17 09:00	Cetirizine
2022-11-17 09:15	Acetaminophen
2022-11-17 09:45	Coughmate
2022-11-17 12:15	Crocin
2022-11-18 09:30	paracetamol
2022-11-18 12:25	Azithromycin
2022-11-18 12:50	Omeprazole
2022-11-19 19:00	Carbamazepine
2022-11-19 19:30	Sodium Valproate
2022-11-20 09:00	Albendazole
2022-11-20 09:45	Amoxicillin
2022-11-20 13:00	Doxycycline

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WOKWI

SAVE SHARE

sketch.ino

```

1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
3 #include <LiquidCrystal_I2C.h>
4 #define LED 2
5 void callback(char* topic, byte* payload, unsigned int payloadLength);
6
7
8 //-----credentials of IBM Accounts-----
9
10 #define ORG "rjgk4d" //IBM ORGANIZATION ID
11 #define DEVICE_TYPE "MyDevice" //Device type mentioned in ibm watson IOT Platform
12 #define DEVICE_ID "12345" //Device ID mentioned in ibm watson IOT Platform
13 #define TOKEN "Ammpa@112" //token
14 String data3="";
15
16
17 //----- Customise the above values -----
18 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // Server Name
19 char publishTopic[] = "iot-2/evt/Data/fmt/json"; // topic name and type of event perform a
20 char subscribeTopic[] = "iot-2/cmd/command/fmt/string"; // cmd REPRESENT command type AND
21 char authMethod[] = "use-token-auth"; // authentication method
22 char token[] = TOKEN;
23 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
24 LiquidCrystal_I2C lcd(0x27,16,2);
25
26 //-----
27 WiFiClient wificlient; // creating the instance for wificlient
28 PubSubClient client(server, 1883, callback, wificlient); //calling the predefined client
29 void setup() // configuring the ESP32
30 {
31   Serial.begin(115200);
32   pinMode(LED, OUTPUT);
33   delay(10);

```

Simulation

ESP32

LED

LiquidCrystal\_I2C

# CHAPTER 9

## RESULTS

self\_reliant

All Documents

Query

Permissions

Changes

Design Documents

Log Out

Document ID

Options

{ } JSON

bell

Create Document

_id	name
2022-11-17 09:00	Cetirizine
2022-11-17 09:15	Acetaminophen
2022-11-17 09:45	Coughmate
2022-11-17 12:15	Crocin
2022-11-18 09:30	paracetamol
2022-11-18 12:25	Azithromycin
2022-11-18 12:50	Omeprazole
2022-11-19 19:00	Carbamazepine
2022-11-19 19:30	Sodium Valproate
2022-11-20 09:00	Albendazole
2022-11-20 09:45	Amoxicillin
2022-11-20 13:00	Doxycycline

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## CHAPTER 10 ADVANTAGES AND DISADVANTAGES

### 10.1 ADVANTAGES

#### ○ Availability:

One of the primary preferences of possessing a PDA is the capacity to stay in contact with individuals through email, text informing, and telephone. Since PDAs are so convenient and their network so broad, clients can take them anyplace.

#### ○ Association:

Another advantage of possessing a PDA is expanded association. Schedule and rundown applications make it simple to monitor arrangements, make notes in a hurry, and document past discussions or other information.

#### ○ Status:

For some PDA clients, the gadget has the additional advantage of meaning a specific status. The organization gave PDAs might be held for more significant level representatives and can come to connote a place of power or significance. For individual clients, having the most recent PDA might be an indication of riches or innovative information.

#### ○ Broad Internet Connectivity:

For occupied people, the primary preferred position of getting a PDA is being able to remain associated through email, calls, text informing, and different courier applications. These are worked with a broad organization network so clients can get to the Internet anyplace they are.

### 10.2 DISADVANTAGES

#### ○ Cost:

One of the greatest hindrances of a PDA is the expense. Other than paying for the gadget itself, most PDAs require the purchaser to buy into a utilization contract. This includes a month-to-month bill and the chance of overage charges if the client outperforms his designated free telephone minutes or information limits.

#### ○ Interruption:

PDAs may likewise turn into an interruption when they're not satisfying an authentic need. The capacity to be constantly associated can prompt sitting around riding the Web, settling on telephone decisions, or messing around. Some business clients whine about

being “available to come into work” when their colleagues and bosses can reach them whenever.

- Time constraint:

PDA's are not generally the best response to business arrangements. Paper-based coordinators are a more reasonable choice since PDA's are hard to utilize, information passage is abnormal, they are moderate and beginner clients discover them super uously unpredictable.

- Restricted in Scope:

PDA's are restricted in degree. They are neither PC substitutions nor would they be able to be successfully used to supplant mobile phones. PDA's are not furnished to manage miniature preparing capacities.

## **CHAPTER 11 CONCLUSION**

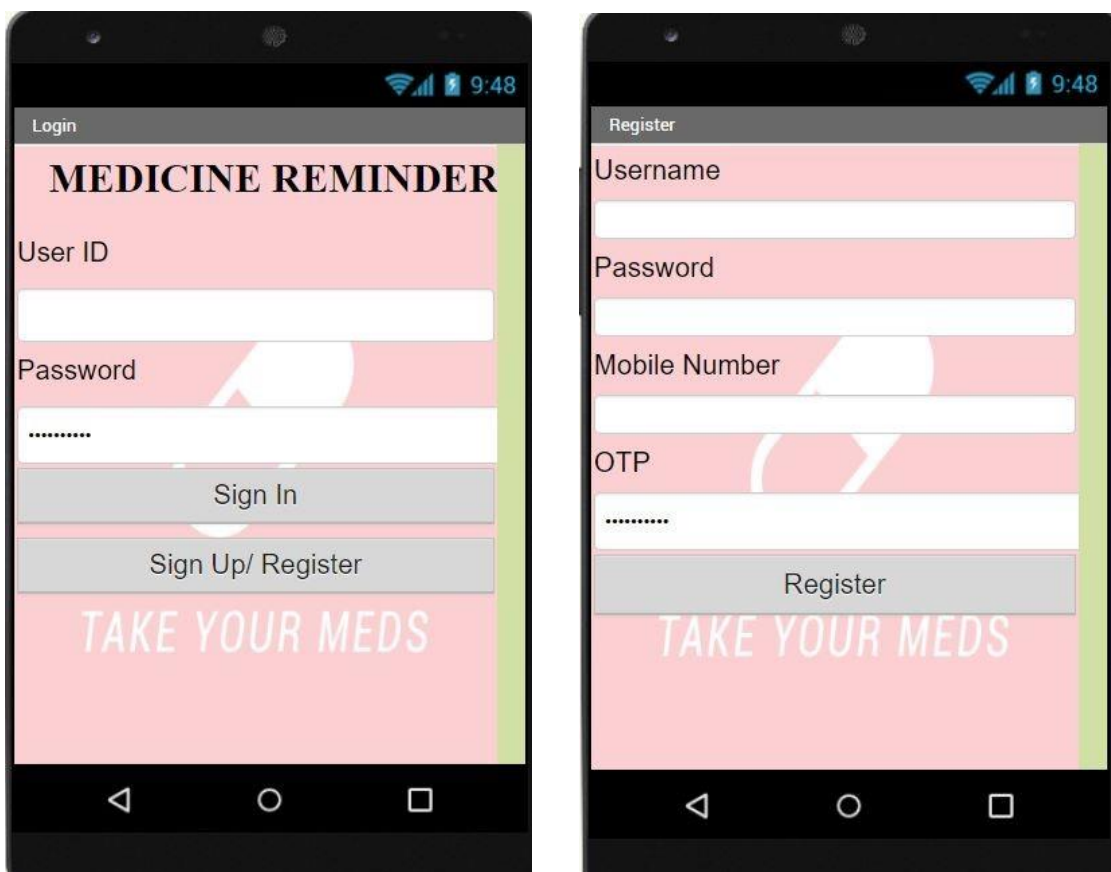
With the progress of science and technology in modern society, the problem of human health care has gradually become an important part of a family. Due to the limitations of the elderly population (such as immobility, memory loss, etc.), there are many problems with medication. Therefore, medication for the elderly needs more attention from society. Drug use accounts for a large proportion of the elderly population, and many products are designed for the elderly. However, many products do not fully conform to the usage habits of the elderly. In today's society, more than 40 percent of the elderly feel lonely. The data show that the happiness of the elderly is largely due to the support and encouragement from their families. The relationship between the elderly and their adult children has also become an important social issue. Many times not taking the medicines on time leads to death or severe issues. So to avoid such situations this application will be very helpful.

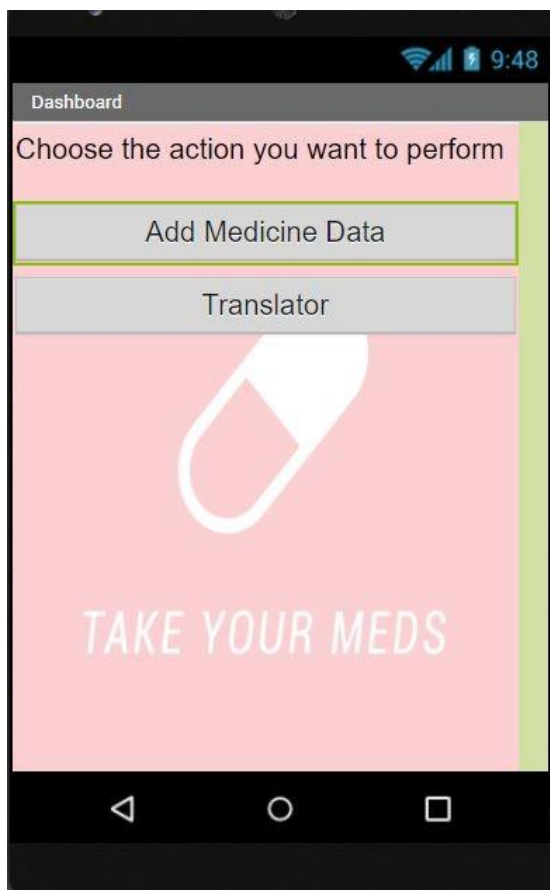
## CHAPTER 12 FUTURE SCOPE

I believe that in the future, we will have many reasons to care about and for the elderly community because this is not only a moral thing but also a prerequisite for the continuation of the development of the world. We need to pay enough attention to this group, and I believe that the medicine reminder application will be of great use to elderly people as they can be independent and live happily and healthily.

An application can also be developed so that it can be interfaced with the IoT device such as a smartwatch, which can further assist in solving the purpose.

A sample application developed using the MIT App Inventor is mentioned.







## CHAPTER 13 APPENDIX

### 13.1 SOURCE CODE WOKWI

#### SIMULATED CODE

```
#include <WiFi.h>//library for wifi

#include <PubSubClient.h>//library for MQTT

#include <LiquidCrystal_I2C.h>

#define LED 2 void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength);

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

#define ORG "rjgkkf"//IBM ORGANITION ID

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

#define DEVICE_ID "12345"//Device ID mentioned in ibm watson IOT Platform

#define TOKEN "Ammipa@112" //Token

String data3="";

//----- Customise the above values -----char server[] = ORG

".messaging.internetofthings.ibmcloud.com";// Server Name

char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of event
perform and format in which data to be send

char subscribetopic[] = "iot-2/cmd/command/fmt/String";// cmd REPRESENT command
type AND COMMAND IS TEST OF FORMAT STRING char authMethod[] = "use-token-
auth";// authentication method char token[] = TOKEN; char clientId[] = "d:" ORG
":" DEVICE_TYPE ":" DEVICE_ID;//client id

LiquidCrystal_I2C lcd(0x27,16,2);
```

```

//-----

WiFiClient wifiClient; // creating the instance for wificlient

PubSubClient client(server, 1883, callback ,wifiClient); //calling the
predefined client id by passing parameter like server id,portand wificredential

void setup()// configureing the ESP32

{ Serial.begin(115200);

  pinMode(LED,OUTPUT);

  delay(10);

  Serial.println();

  wificonnect();

  mqttconnect();

}

void loop()// Recursive Function

{ if (!client.loop()) {

  mqttconnect();

}

}

/*.....retrieving to

Cloud.....*/ void

mqttconnect() { if (!client.connected()) {

  Serial.print("Reconnecting client to ");

  Serial.println(server); while

  (!!!client.connect(clientId, authMethod, token)) {

    Serial.print(".");

    delay(500);

```

```

    }

    initManagedDevice();

    Serial.println();

} } void wificonnect() //function defination for
wificonnect

{

    Serial.println();

    Serial.print("Connecting to ");

    WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish
the connection while (WiFi.status() != WL_CONNECTED) { delay(500);
Serial.print(".");

    }

    Serial.println("");

    Serial.println("WiFi connected");

    Serial.println("IP address: ");

    Serial.println(WiFi.localIP());

}

void initManagedDevice() { if
(client.subscribe(subscribetopic)) {

    Serial.println((subscribetopic));

    Serial.println("subscribe to cmd OK");

} else {

    Serial.println("subscribe to cmd FAILED");

}
}

```

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

    Serial.print("callback invoked for topic: ");

    Serial.println(subscribetopic); for (int i =
0; i < payloadLength; i++) {
//Serial.print((char)payload[i]); data3 +=
(char)payload[i];
}

    Serial.println("Please take "+ data3);

    if(data3 != "")
    { lcd.init();
        lcd.print("Take"+ data3);

digitalWrite(LED,HIGH);

delay(20000);

digitalWrite(LED,LOW);

    }

    else {

digitalWrite(LED,LOW);

    }

    data3="";
}
```

Project video: [https://drive.google.com/file/d/1-yyxmv4MBnj\\_8ShCdvSU6rJ7oXiN7TXD/view?usp=share\\_link](https://drive.google.com/file/d/1-yyxmv4MBnj_8ShCdvSU6rJ7oXiN7TXD/view?usp=share_link)