Personal Assistance for Seniors Who Are Self-Reliant

PROJECT REPORT

1.INTRODUCTION

1.1. Project Overview:

Elderly people tend to forget which pill should be taken at what time. And also, there is much burden placed on the caregivers. This makes the caregivers and also the patients frustrated. We developed a Web application integrated with IoT device to provide scheduled voice output and display the medicine name on a microcontroller during intake

1.2. Purpose

To carter to the needs of the elderly lacking physical assistance during their course of medication.

To provide better quality of life for individuals with chronic disabilities and their caregivers.

Improved ability to stay self-sufficient at home

2.LITERATURE SURVEY

2.1. Existing Problem

The existing methodologies include various gadgets available to assist patients in taking their medication either by simplifying administration or by assisting them in remembering to do s

Pill reminder charts, drug diaries, calendar clocks, telephone prompting service, 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

- Voice assistants based on smart speakers- Gunther Eyesenbach- 2021- The advantages of this kind of gadget are seen differently by older persons, although little is known about this. The ease of a speech-based engagement contributed to the favourable first reception to voice assistants. Particularly, it was common to finish an engagement with a voice assistant by expressing gratitude or providing criticism on the quality of the responses. Asking queries about health care and streaming music were the two main themes of ordersgiven during the first conversation. However, the majority of the subsequent responses were negative due to the challenges in creating a structured language for a command.
- Personal Care Assistants (PCAs)- Maria Gabriella Melchoire- 2022 - Caring help is essential for carrying out everyday activities when older persons age alone and become weak with functional limitations. The current study set out to examine the role and features of privately employed Personal Care Assistants (PCAs) who provide care for elderly people in Italy in light of the family's decreasing capacity to provide care and the underresourcing of governmental services. In the "Inclusive ageing in place" (INAGE) project, 120 qualitative interviews with elderly persons in their homes in the Italian regions of Lombardy, Marche, and Calabria were conducted in 2019. Along with some basic quantifications of assertions, a content analysis was done. Results revealed that PCAs were helpful in 27 situations, mostly when older citizens' health difficulties were raised
- Voice-controlled Intelligent Personal Assistants(VIPAs)- Katherine O'Brien MD - 2019 The desire of many older persons to age in place may be supported with voice-controlled intelligent personal assistants (VIPAs; examples include Amazon Echo and Google Home). The use of VIPAs by older persons in the actual world hasn't been studied before. We wanted to find out how elderly people and their caretakers use VIPAs. Retrospective analysis of all Amazon Echo reviews with confirmed purchases that were published

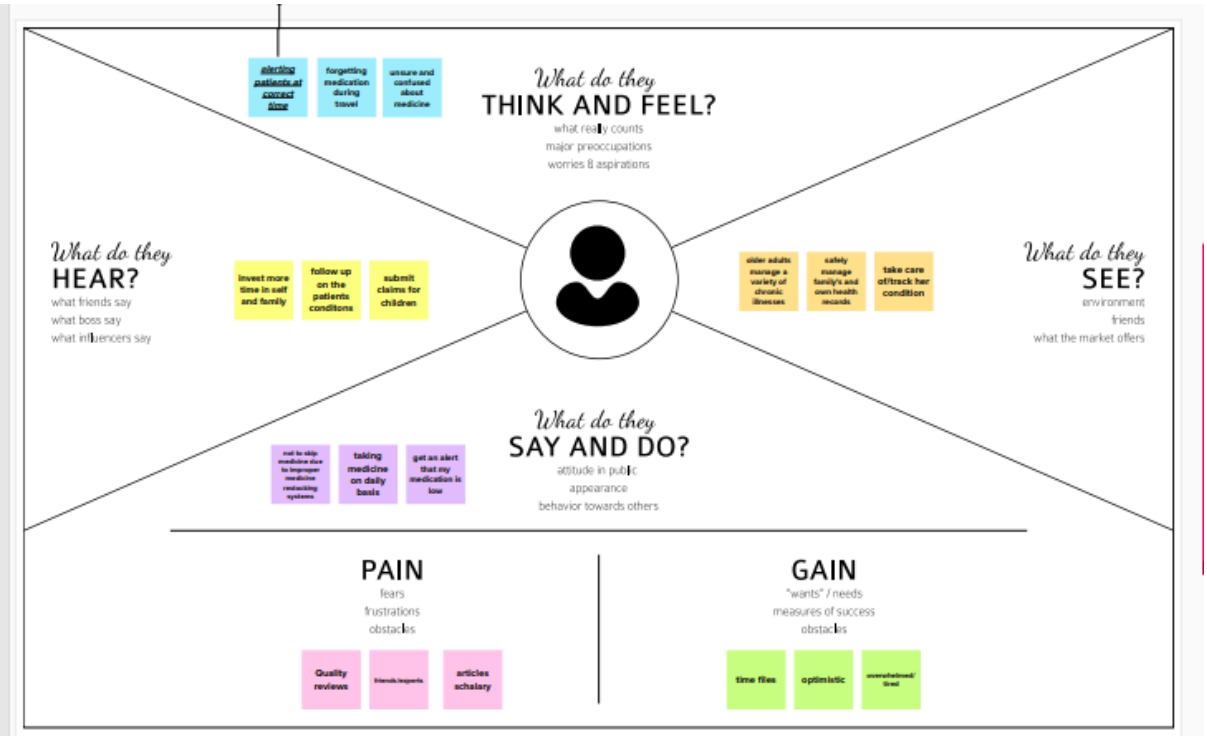
on the website between January 2015 and January 2018, with the health-related older adult key terms filtered out. To find pertinent themes, openended reviews were qualitatively examined.

2.3. Problem Statement

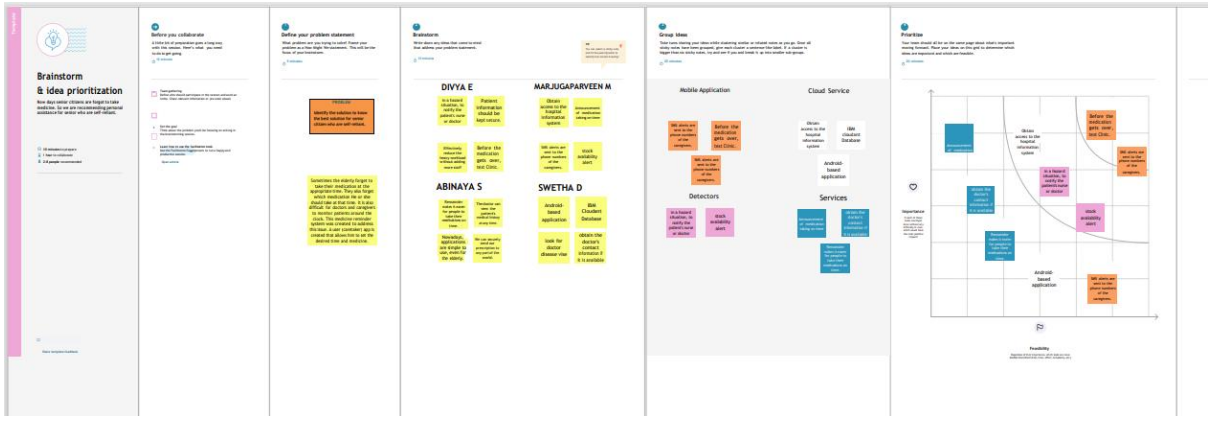
Skipping medicines can be serious for some medical health conditions; Sometimes elderly people forget to take their medicine at the correct time. They also forget which medicine one should take at that particular time. And it is difficult for doctors/caretakers to monitor the patients around the clock.

3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstroming:

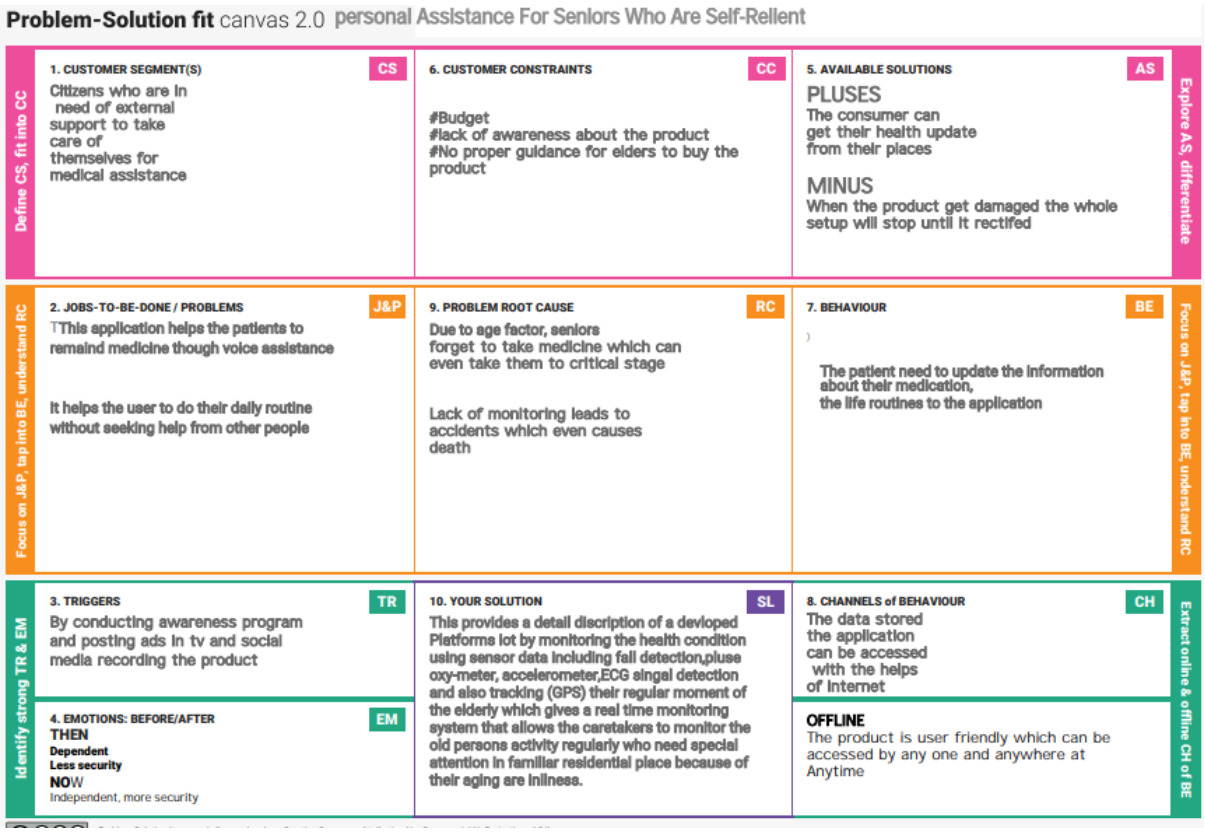


3.3 Proposed solution

S.NO.	PARAMETER	DESCRIPTION
1	Problem Statement (Problem to be solved)	Most of the elderly people forget to take their medicine at the correct time. They also forget which medicine He / She should take at correct time without skipping. And it is difficult for doctors/caretakers as well as patient to monitor around the clock. To avoid the problem, the medicine reminder application is developed. An app is built for the user (patient) and caretaker which makes him/her to set the desired time for prescribed medicine
2	Idea / Solution description	We introduce a medicine reminder application based on IOT. The proposed system was particularly created for the Android platform. In our app, we implement a reminder system which provides an alarm a reminder that it is the time for taking medicine. Along with that, the user can set their medicine time with its name as prescribed by doctor. In the application, there will some feature that help the user to know more details about their medicine. It's been tracked by the doctors and caretakers to know whether the patient intake medicines correctly
3	Novelty / Uniqueness	It is an easy app for the user as that sends medicine reminders and indicate to refill, and mainly helps the caretakers to take a

		free of reminding medicines to the beloveds but also monitor them easily. Even deaf people can use this as we have an option to vibrate instead of alarm for them
4	Social Impact / Customer Satisfaction	We constructed this based on the research findings from the user interview. The correct time of intaking medicines will make a patients feel healthy and helps them to recover from disease or disorder quickly
5	Business Model (Revenue Model)	By our web application the profit or revenue can be made from some pop-up advertisements and relatable medical care advertisements
6	Scalability of the Solution	Large number of people can be supplied and where the user can set their medicine time. In the application, there will some feature that help the user to know more details about their medicine that is prescribed

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 from Registration tgrough email
FR-2	User Confirmation	Conformation via email conformation via OTP
FR-3	User Need	User forget to take their medicine at the correct time. Sometimes 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
FR-4	Implementation process	When the medicine time arrives the web application will send the medicine name to the IoT Device. The device will receive the medicine name and notify the user with voice commands.

4.2 Non-functional Requirements:

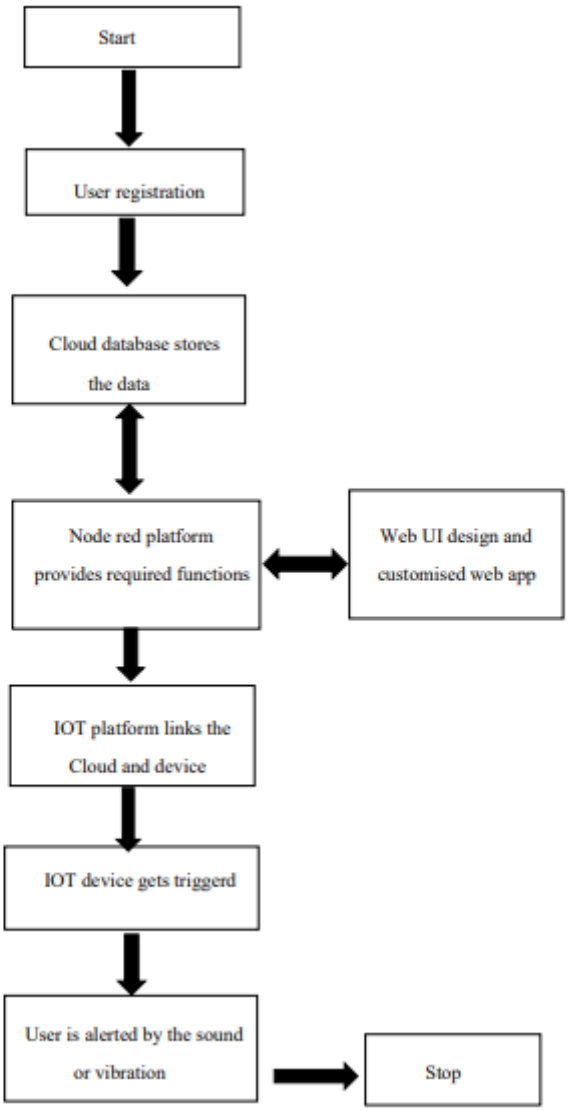
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The device is user friendly and users will be notified to take the prescribed medicine at the right time.
NFR-2	**Security**	All the important data will be kept safe which is stored to remind the patient , in case of crash appears the device should be able to backup and recover the data.
NFR-3	**Reliability**	The device will be quality of being trustworthy and performing consistently well in giving all functionalities.
NFR-4	**Performance**	Performance of the device depends on the response time and speed of the data to be transferred. The device is faster and direct which depends on the efficiency of implemented algorithm.
NFR-5	**Availability**	The device will be available for 24x7 for users without any interruption.
NFR-6	**Scalability**	Support future increases in throughput (number of users) Maintains best possible user experiences.

5.PROJECT DESIGN

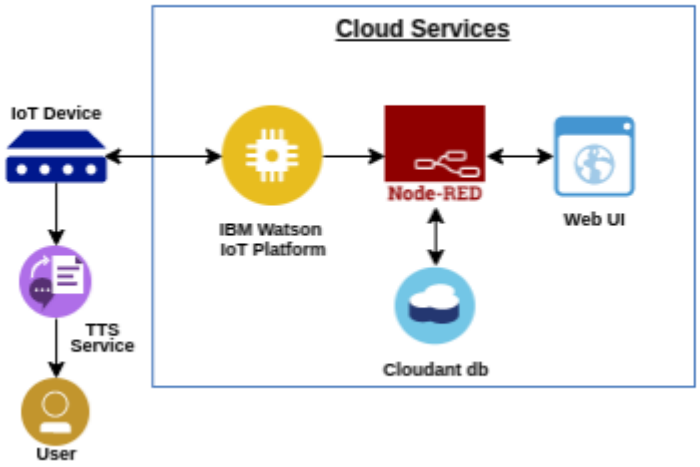
5.1 Data Flow Diagrams:

A Data Flow Diagrams (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information and where data is stored.

FLOW CHART:



5.2 Solution & Technical Architecture:



5.3 User Stories

USER TYPE	FUNCTIOAL REQUIREMENT (Epic)	USER STORY NUMBER	USER STORY/TASK	ACCEPTANCE CRITERIA	PRIORITY	RELEASE
Customer (Mobile user)	Registration	USN-1	The user registers the name, email id and password	Access the account	High	Sprint 1
		USN-2	The user receives the conformation mail on registered mail id	Received the confirmation mail and confirmed	High	Sprint 1
		USN-3	As a user, I can register for the application through Facebook.	I can register & access the dashboard with Facebook login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register through Gmail	Medium	Sprint -1

	Login	USN-5	The user can login the application by email and password	I can go through the Gmail and password	High	Sprint-1
	Dashboard		Shows information about the user	I can access my account and see my login details through it	Medium	Sprint-2
Customer (Web user)	Home Page	USN-6	The Home page shows the basic information for the user about the current health status of patients	I can see the home page by login	High	Sprint-3
Customer Care Executive	Logout	USN-7	User can use the application and get reminder about the intake of medicines to the patients	I get an remainder about intake of medicines and logout the page	High	Sprint-3
Administrator	Admin	USN-8	Admin can check the user details	Admin can continuously Check the user details	Low	Sprint-4
			Admin can update the recent prescribed medicines, as the information is very useful for both patient and caretaker	Admin can continuously update the medicine details by the doctor advice	High	Sprint-4
			Admin can find more features about the application	Admin can update the features	Low	Sprint-4
			Admin can update more features about application its helpful to get reminder on medicine	Admin can set reminder for intake of the medicine by patient on time.	High	Sprint-4

			intake with latest medical reports also.			

6.PROJECT PLANNING & SCHEDULING:

6.1 Sprint Planning & Estimation:

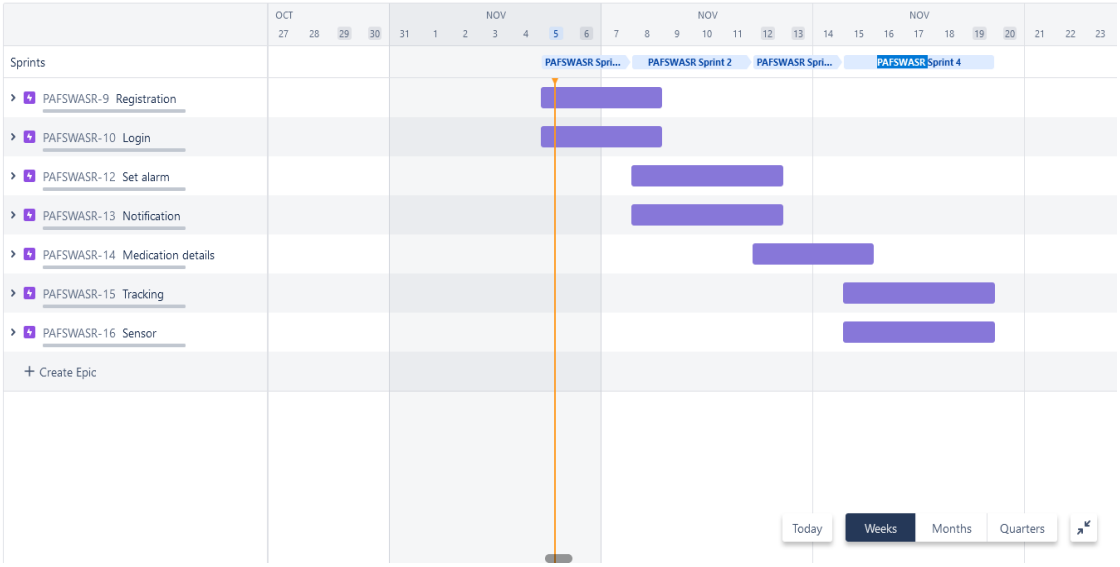
SPRINT	FUNCTIONAL REQUIREMENT (Epic)	USER STORY NUMBER	USER STORY/TASK	STORY POINT	PRIORITY	TEAM MEMBER
Sprint 1	Registration	USN-1	As a user, I can register for the application by entering my email, password and confirming my password	2	High	Divya E
Sprint-1	Login	USN-2	As a user I will login into the application by entering email and password	1	Medium	Swetha D
Sprint-2	Set alarm	USN-3	As a user I can set the alarm to altering a medicine intake	2	High	Abinaya S
Sprint-2	Notification	USN-4	Once I can set the alarm then I get a notification	2	High	Marjuga Parveen M
Sprint 3	Medication details	USN-5	As a user, between setting an alarm using a pillbox, I'll be able to stay on top of medications and not miss a dose	1	Low	Divya E

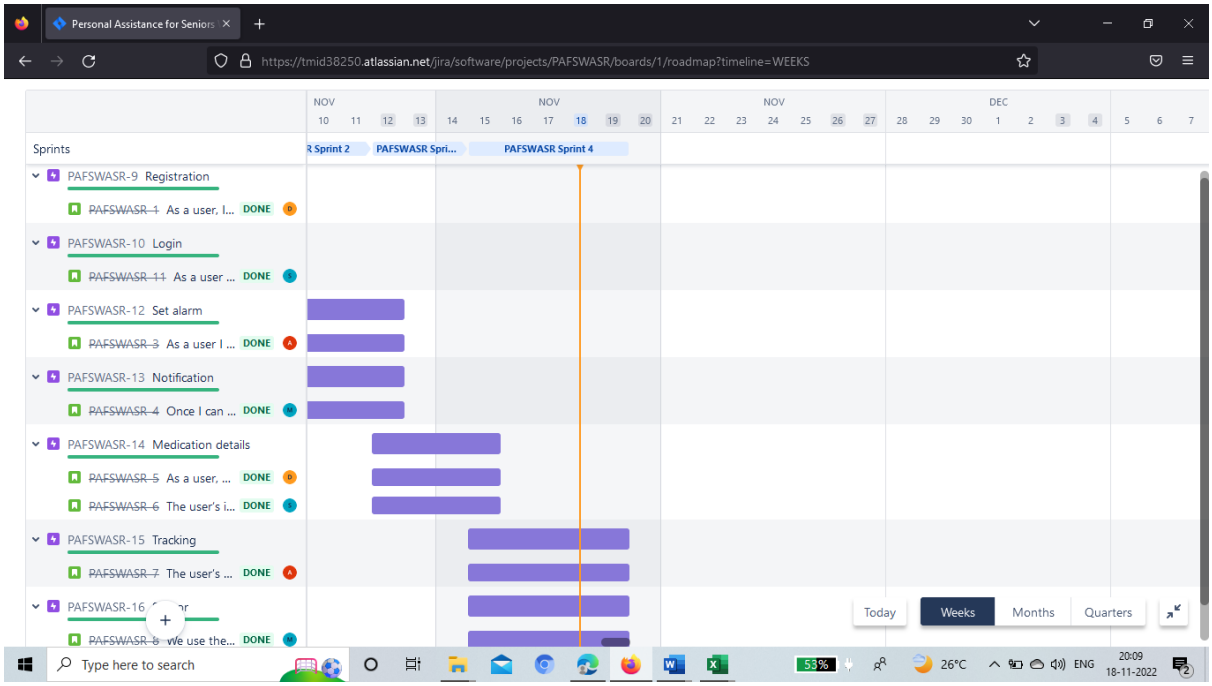
Sprint 3		USN-6	The user's intake medicines are scheduled as per prescription	2	High	Swetha D
Sprint 4	Tracking	USN-7	The user's details can also be viewed by the respective hospitals	2	High	Abiniya S,
Sprint 4	Sensor	USN-8	We use the IOT enabled Arduino device for monitoring the system	1	Medium	Marjuga Parveen M

6.2 Sprint Delivery Schedule:

SPRINT	TOTAL STORY POINTS	DURATION	SPRNT START DATE	SPRINT END DATE (Planned)	STORY POINTS COMPLETED (as on planned end date)	SPRINT RELEASE DATE(Actual)
Sprint-1	20	4 Days	5/11/22	8/11/22	3	29/10/22
Sprint-2	20	4 Days	8/11/22	12/11/22	4	12/11/22
Sprint-3	20	4 Days	12/11/22	15/11/22	3	15/11/22
Sprint-4	20	4 Days	15/11/22	19/11/22	3	19/11/22

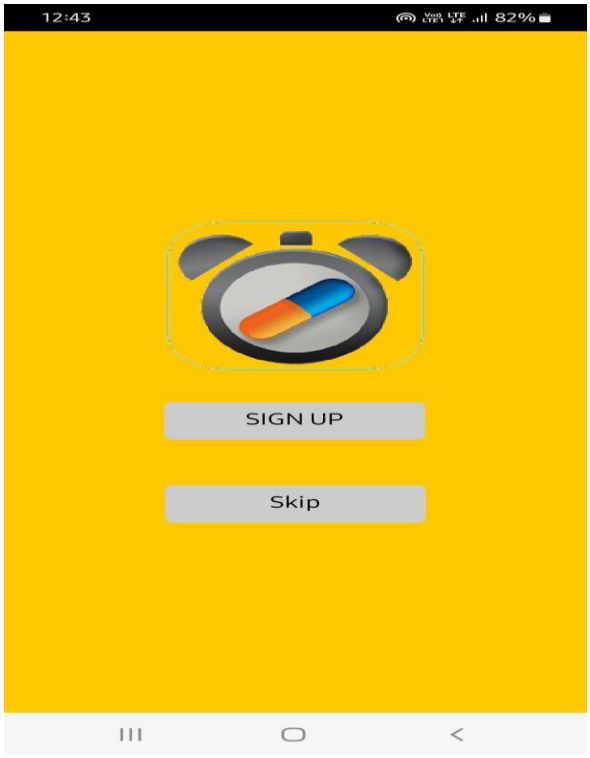
6.3 Reports from JIRA

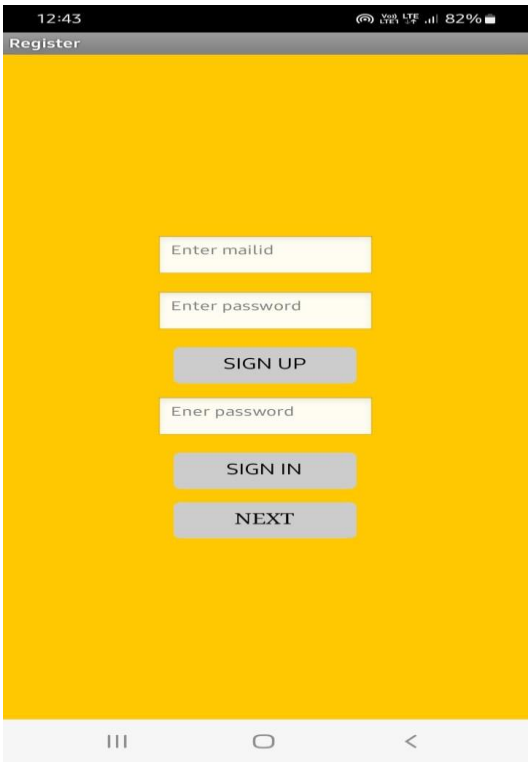


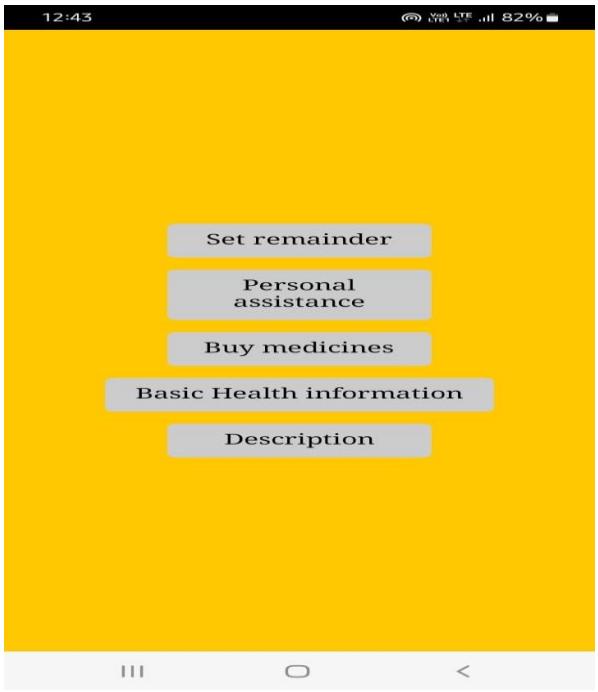


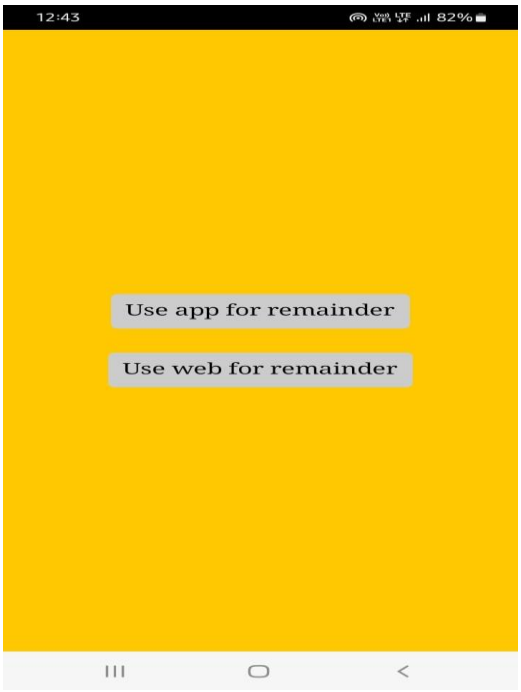
7.CODING & SOLUTIONING

7.1 Features:







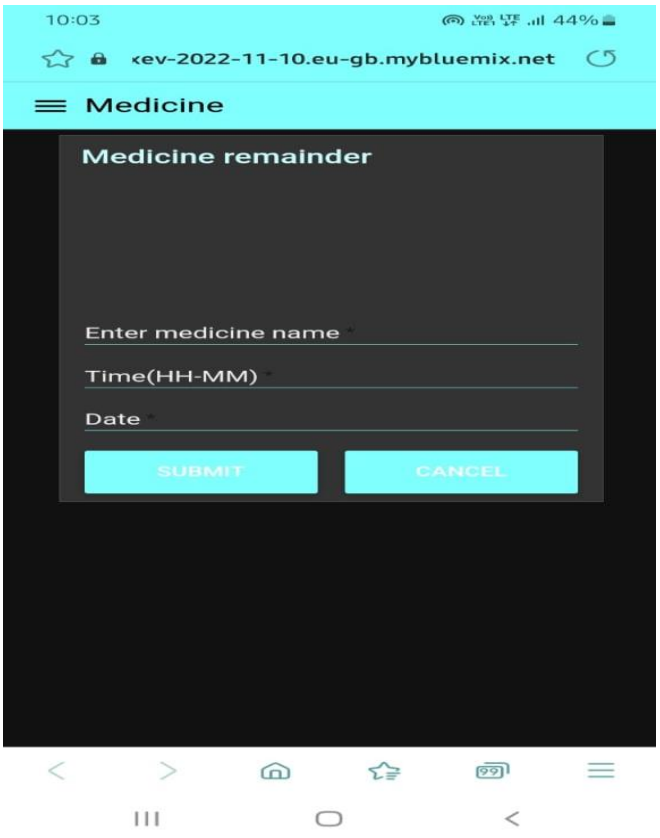


When you enter the app you may sign up or skip the process and go to the selection page .but when you want

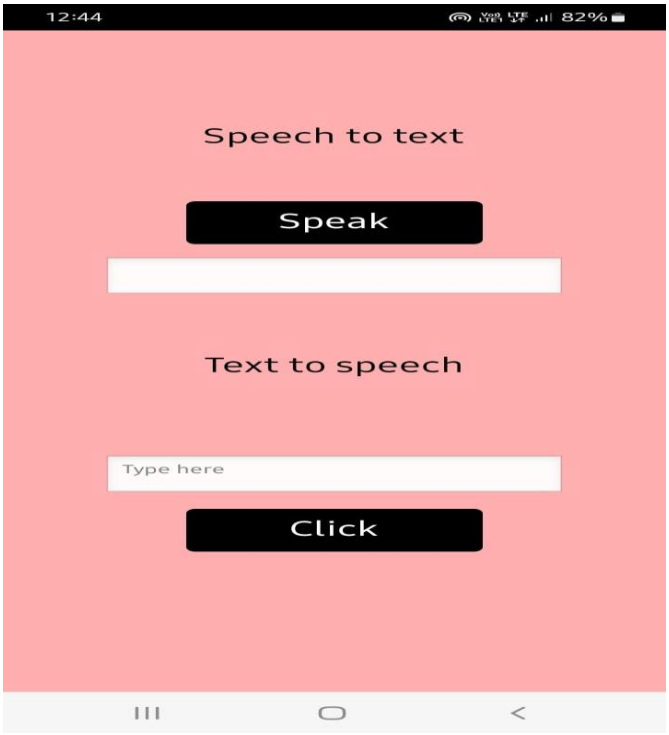
to sign up you should give the needed information and click next.

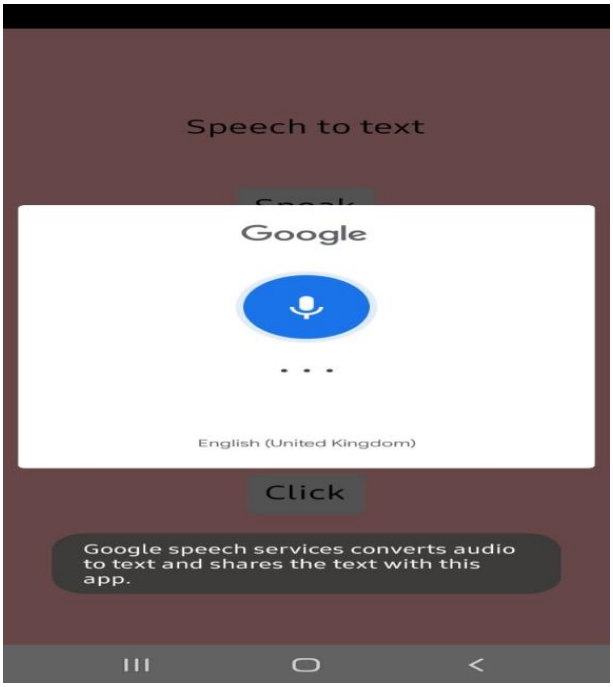
In selection page if a user wants to set the remainder then click on the button which will redirect to the page of options to use whether to use the app or web

If the user choose the app the all the details will store in cloud DB in MIT app or if the user choose web the all the details will stored in ibm cloud database through node red.



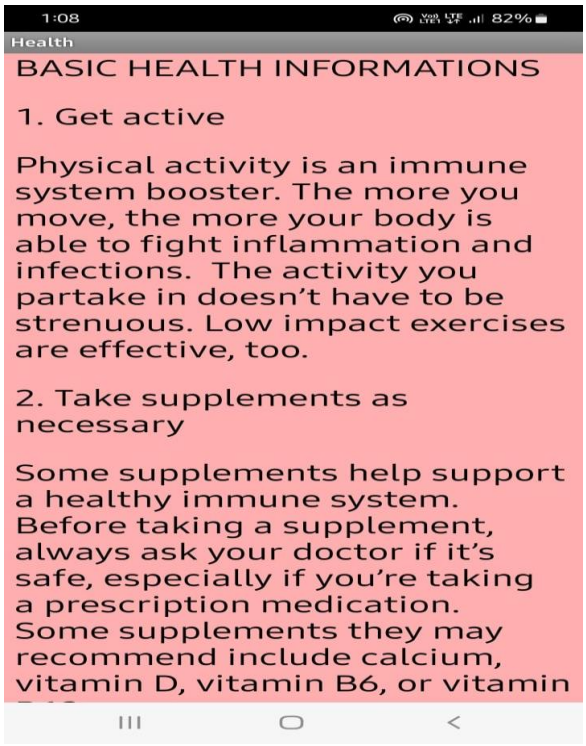
2.Next the button personal assistance used to convert the text to speech and speech to text

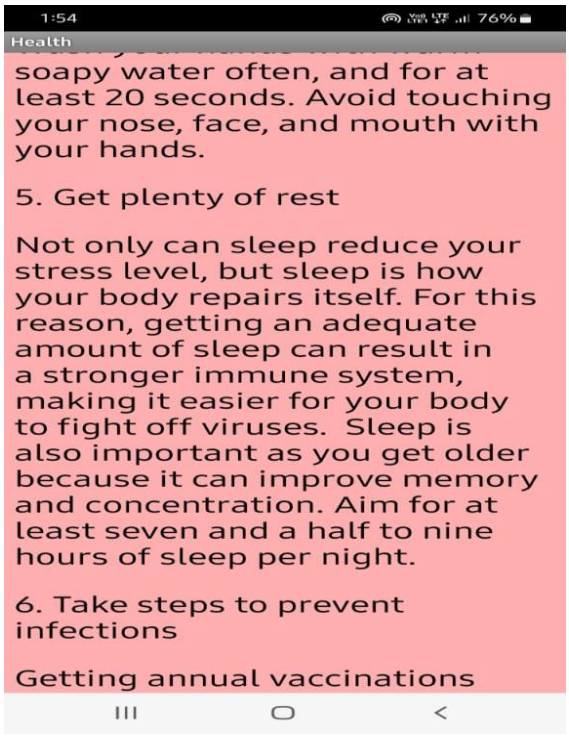


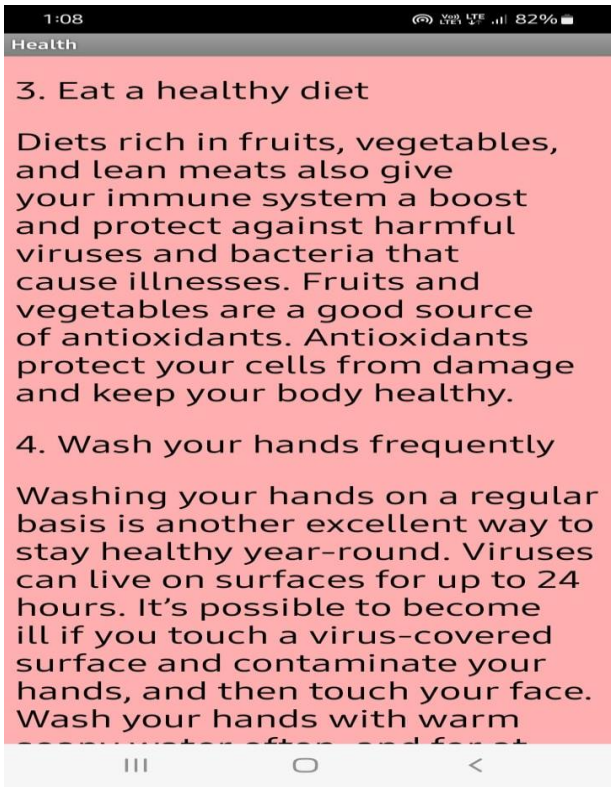


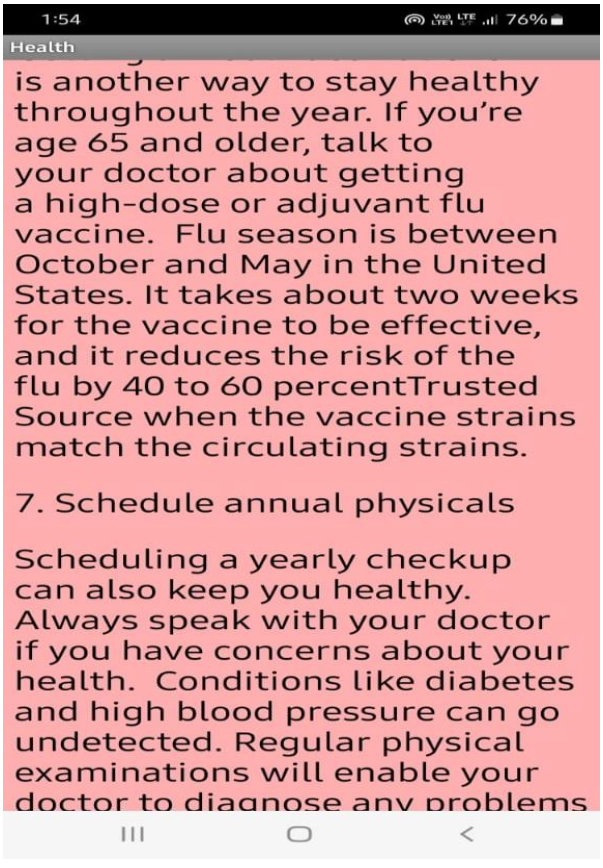
3.After this the third button is buy medicines, the button that redirects to the online pharmacy page where the user can buy medicines through online

4.The fourth button tells the user about basic health instructions that to be followed on daily basis for good health.

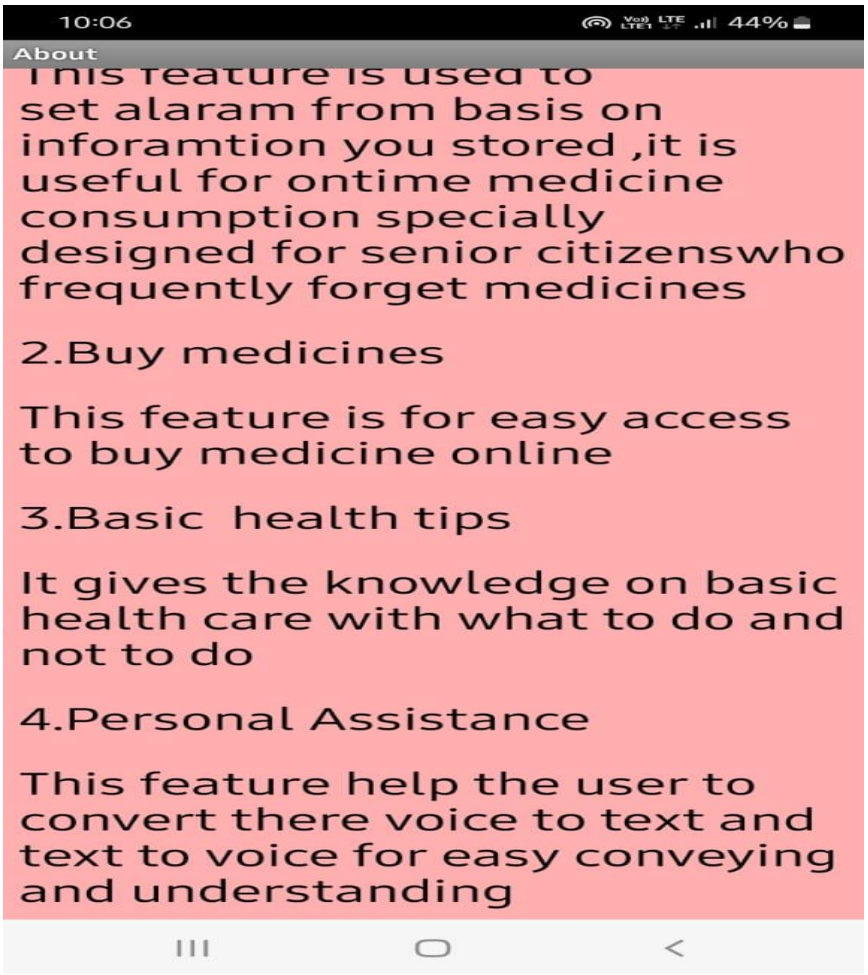








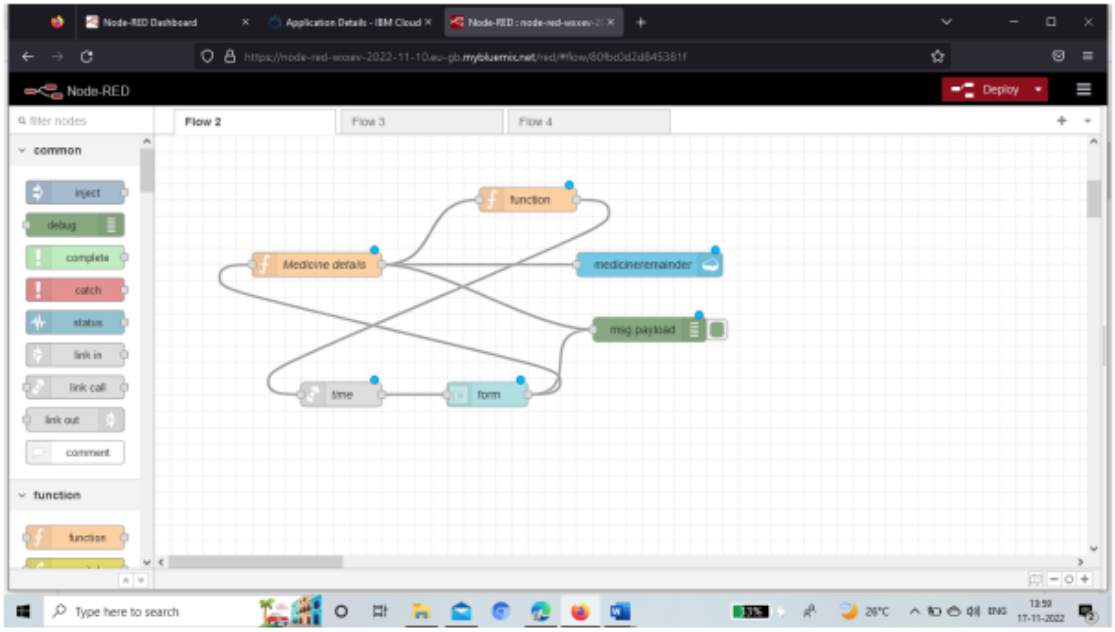
5.The last one is description button that helps the user to know the usage of entire application



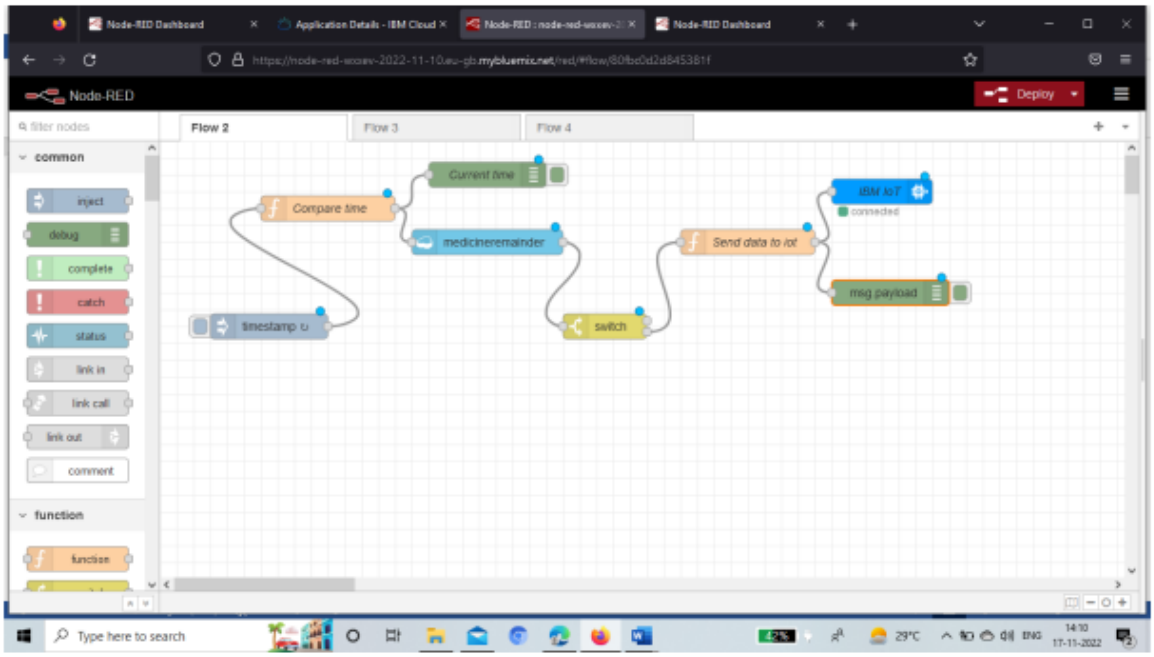
7.2 Feature 2

Node red configuration

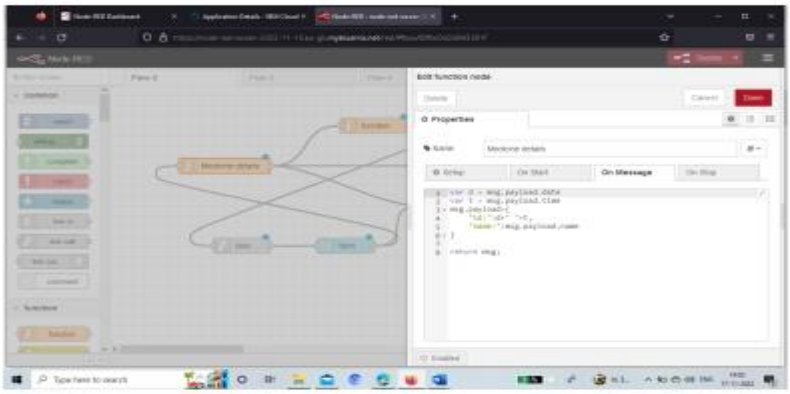
1.TO CREATE A FORM DASHBOARD

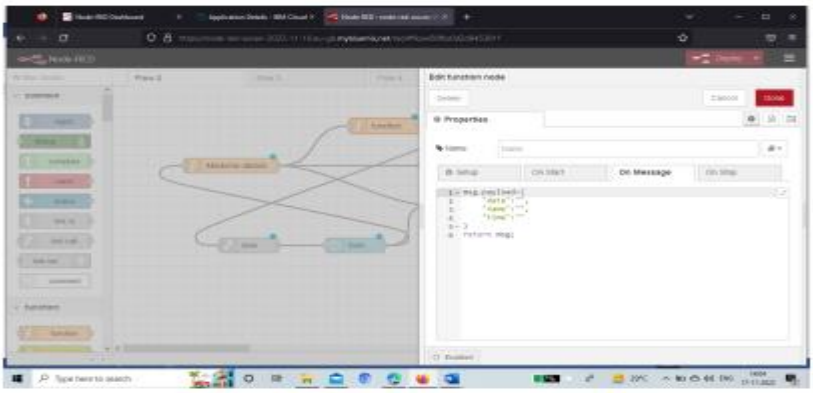


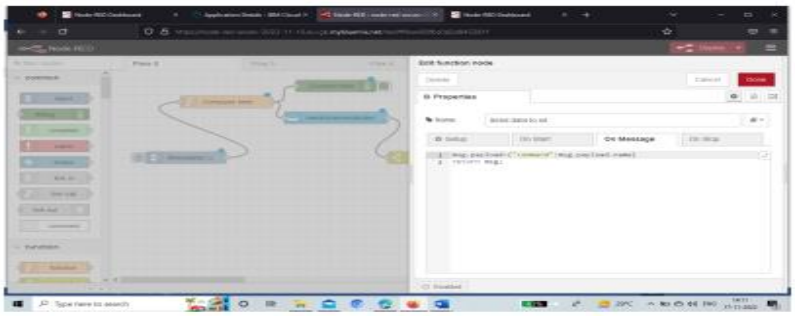
2.TO SEND MEDICINE DETAILS TO IOT DEVICE



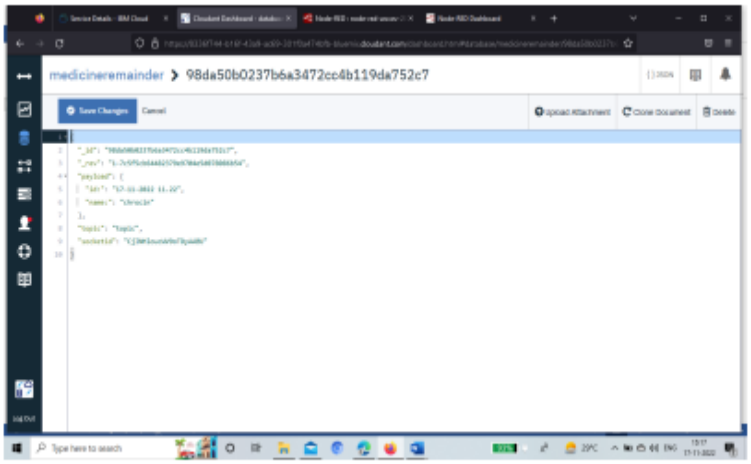
Functions:



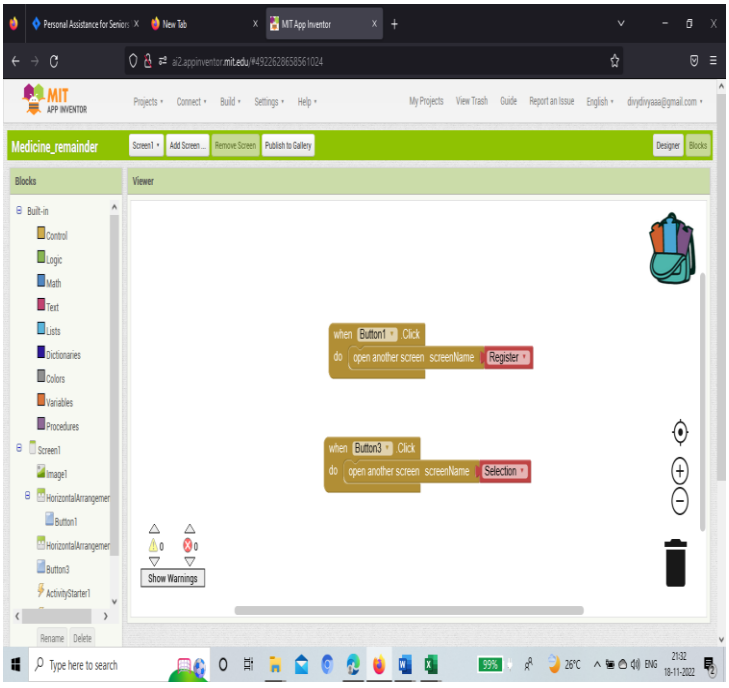




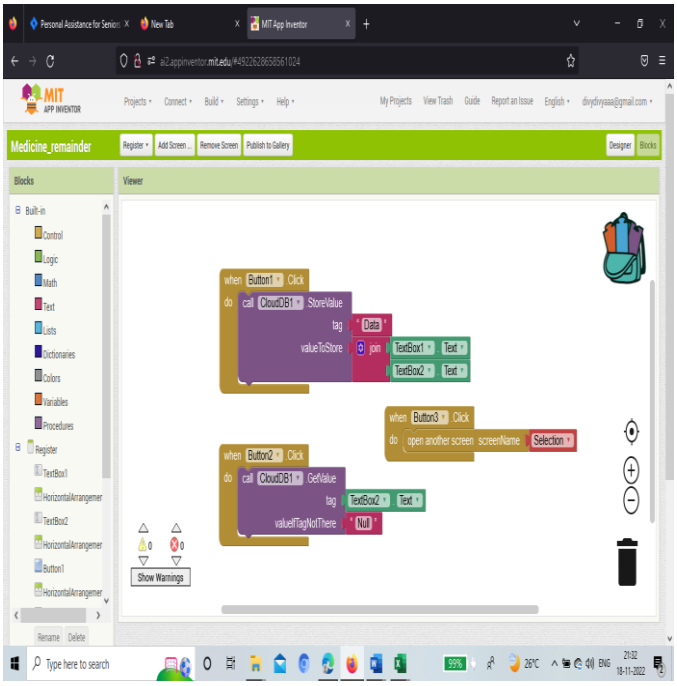
7.3 DataBase Schema:



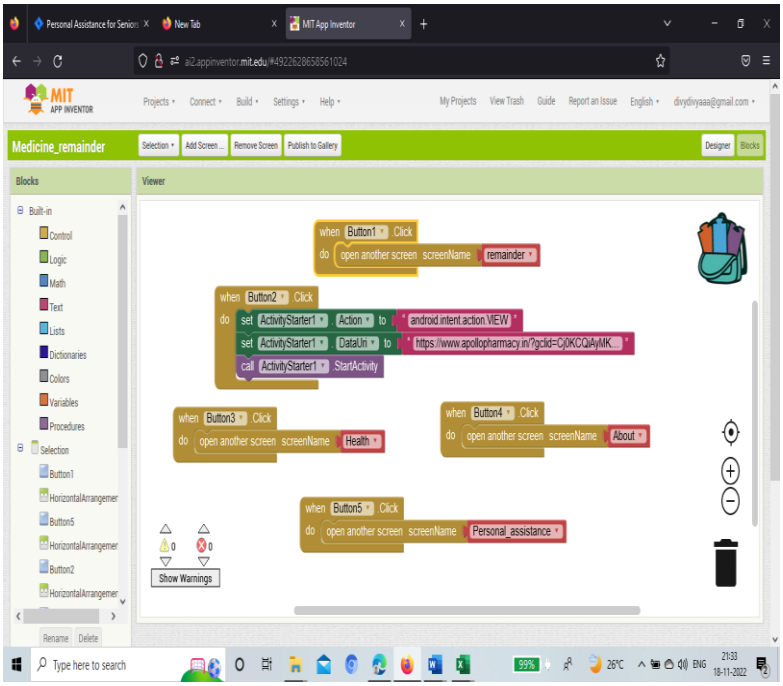
Blocks of MIT app inventor:



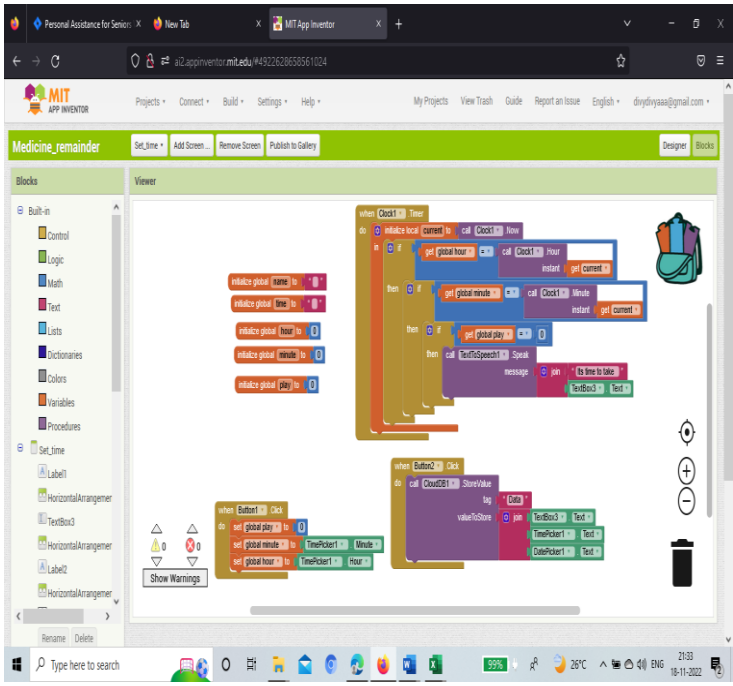
Home page



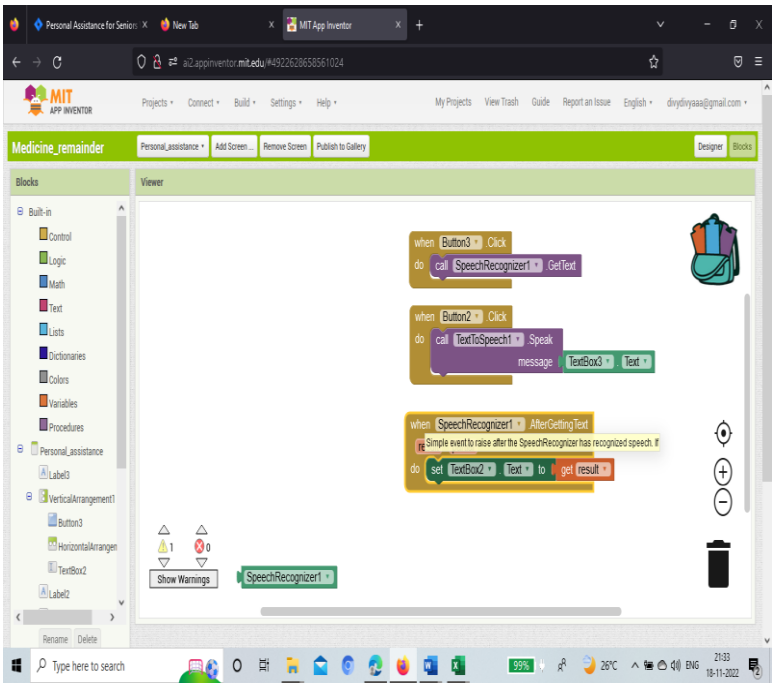
Signup page



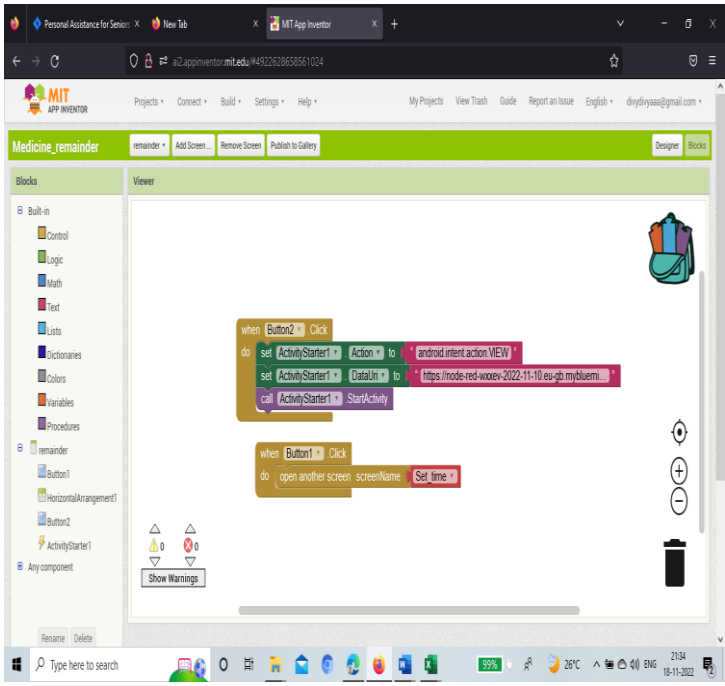
Selection page



Set time using app page



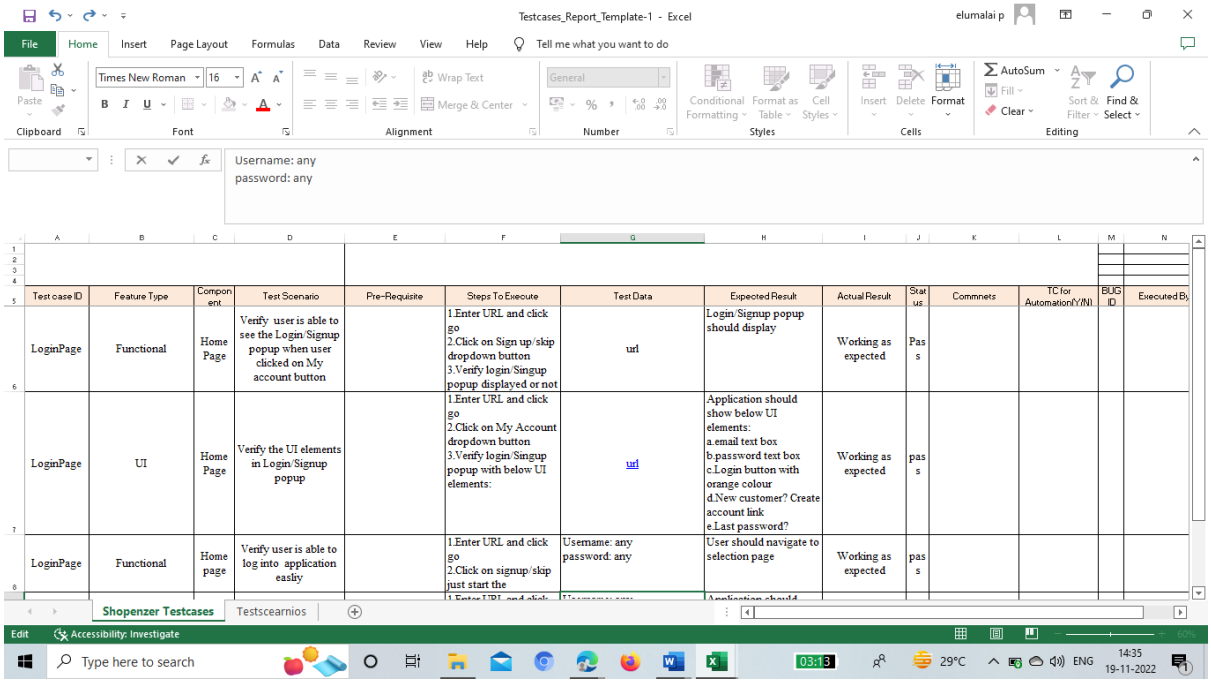
Text to speech page



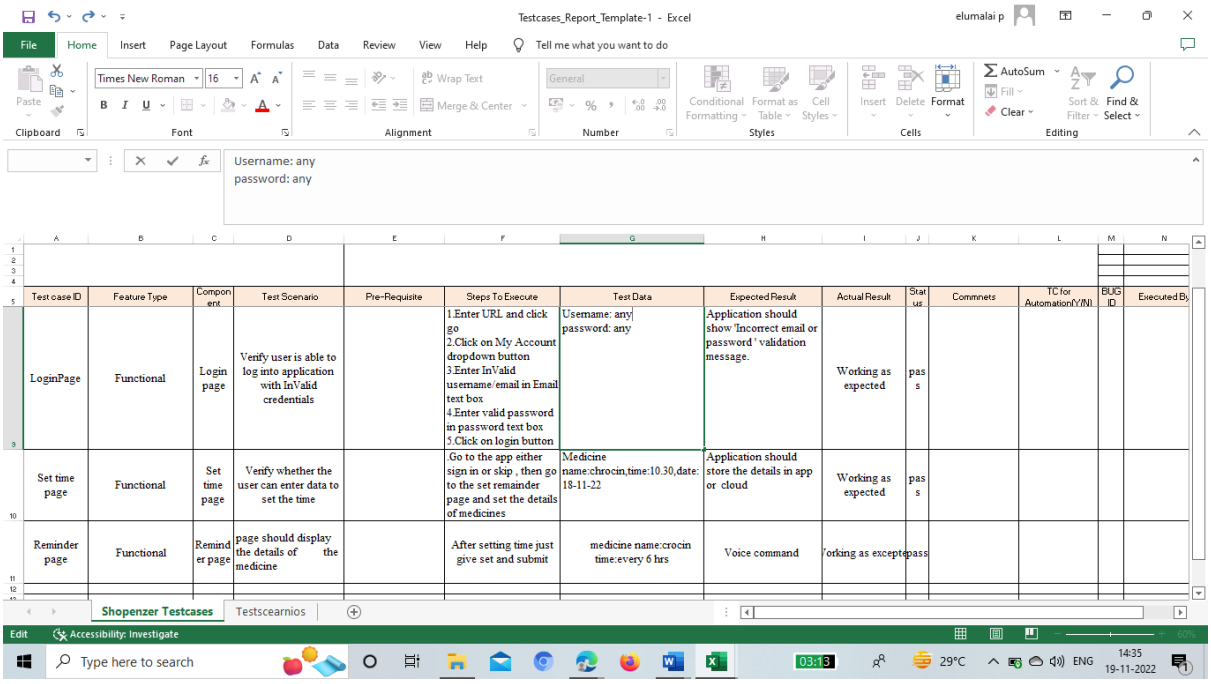
Set time using web app

8.TESTING:

8.1 Test cases:

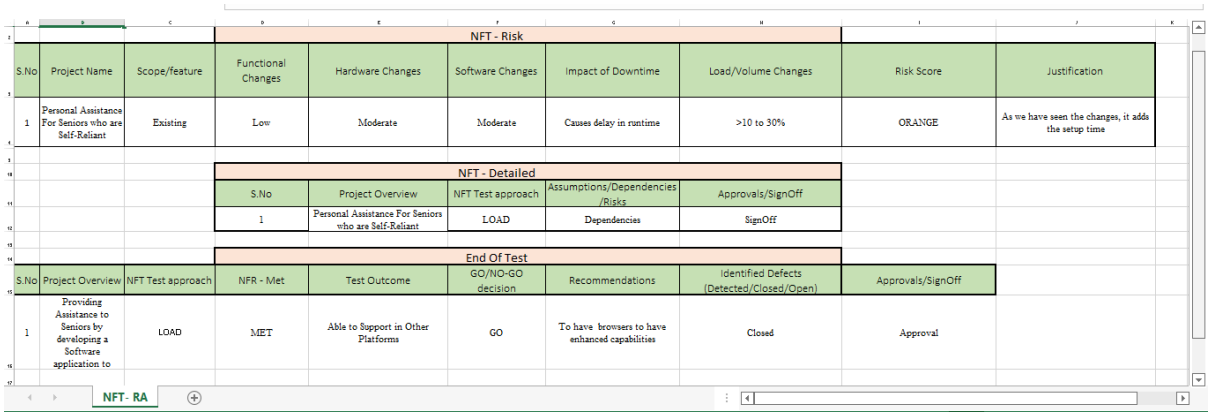


Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
LoginPage	Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on My account button		1.Enter URL and click go 2.Click on Sign up/skip dropdown button 3.Verify login/Singup popup displayed or not	url	Login/Signup popup should display	Working as expected	Pass				
LoginPage	UI	Home Page	Verify the UI elements in Login/Signup popup		1.Enter URL and click go 2.Click on My Account dropdown button 3.Verify login/Singup popup with below UI elements:	url	Application should show below UI elements: a.email text box b.password text box c.Login button with orange colour d.New customer? Create account link e.Last password?	Working as expected	pass				
LoginPage	Functional	Home page	Verify user is able to log into application easily		1.Enter URL and click go 2.Click on signup/skip just start the	Username: any password: any	User should navigate to selection page	Working as expected	pass				



Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
LoginPage	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter URL and click go 2.Click on My Account dropdown button 3.Enter InValid username/email in Email text box 4.Enter valid password in password text box 5.Click on login button	Username: any password: any	Application should show 'Incorrect email or password ' validation message.	Working as expected	pass				
Set time page	Functional	Set time page	Verify whether the user can enter data to set the time		Go to the app either sign in or skip , then go to the set remainder page and set the details of medicines	Medicine name:chrocin,time:10.30,date:18-11-22	Application should store the details in app or cloud	Working as expected	pass				
Reminder page	Functional	Reminder page	page should display the details of the medicine		After setting time just give set and submit	medicine name:crocin time:every 6 hrs	Voice command	Torking as excepte	pass				

Performance testing:



NFT - Risk

S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Volume Changes	Risk Score	Justification
1	Personal Assistance For Seniors who are Self-Reliant	Existing	Low	Moderate	Moderate	Causes delay in runtime	>10 to 30%	ORANGE	As we have seen the changes, it adds the setup time

NFT - Detailed

S.No	Project Overview	NFT Test approach	Assumptions/Dependencies /Risks	Approvals/SignOff
1	Personal Assistance For Seniors who are Self-Reliant	LOAD	Dependencies	SignOff

End Of Test

S.No	Project Overview	NFT Test approach	NFR - Met	Test Outcome	GO/NO-GO decision	Recommendations	Identified Defects (Detected/Closed/Open)	Approvals/SignOff
1	Providing Assistance to Seniors by developing a Software application to	LOAD	MET	Able to Support in Other Platforms	GO	To have browsers to have enhanced capabilities	Closed	Approval

NFT- RA

8.2 User Acceptance testing:

The purpose of this document is to briefly explain the test coverage and open issues of the [Product Name] project at the time of the release to User Acceptance Testing (UAT).

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	10	4	3	2	20
Duplicate	1	0	3	0	4
External	2	3	1	0	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	15	24	78

Test Case Analysis

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

Section	Total cases	Not Tested	Fall	Pass
Print Engine	2	0	0	2
Client Application	2	0	0	2
Security	1	0	0	1
Outsource Shipping	1	0	0	2
Exception Reporting	2	0	0	2
Final Report Output	1	0	0	1
Version Control	1	0	0	1

9.RESULT:

S.NO	PARAMETER	PERFORMANCE
1	Response Time	0.5s (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 & DISADVAANTAGES:

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.
- As the remainder is in the format of voice it’s easy to know the medicine name to take on a particular time.
- Safe and secure

Disadvantages:

- Makes people lethargic and makes them dependent always on others.
- Requires a stable internet connection.
- Elderly people should be aware of how to use the application

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. Better quality of life for individuals with chronic disabilities and their caregivers. Improved ability to stay self-sufficient at home.

12. FUTURE SCOPE

The project can be further developed by using 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. Further we can extend the app where the prescriptions of the patients will be directly uploaded to the database. When

your medicine runs low, we will reach out to third parties so you can get it delivered at your door.

13.APPENDIX

Source 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
"ok5c7o"//IBM ORGANITION ID
#define ORG "8n29fa"
#define DEVICE_TYPE "Medicineremainder"//Device type
mentioned in ibm watson IOT Platform
#define DEVICE_ID "29072001"//Device ID mentioned in ibm
watson IOT Platform
#define TOKEN "pY0&w-7vXlnygu7I5B" //Token
String data3="";
int buzz = 13;
//-------- Customise the above values -------- char
server[] = ORG
".messaging.internetofthings.ibmcloud.com";// Server Name
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
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="";
}
```

GitHub link: https://github.com/IBM-EPBL/IBM-Project-52830-1661158691

Project Demo link:

https://www.mediafire.com/file/c2jkxizlu3qkuci/Video.Guru_20221119_211926492.mp4/file