REPORT

REPORT TEAM ID :	PNT2022TMID50604
PROJECT NAME :	PERSONAL ASSISTANCE FOR SENIORS WHO ARE SELF-RELIANT
MEMBERS:	SADHANA SHRI DHARMARAJAN (TEAM LEADER)
	DURGA N
	PREETHI N
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CHAPTER 1

INTRODUCTION

1.1 PROJECT OVERVIEW:

The Project concentrates on creating a medicine reminder application. Medicine Reminder Project is an native android application meant to aid the forgetful and busy senior citizens with 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 in the correct timings.

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 design of caring for the seniors has always been an important issue for the development of society. With the aging population in many countries, there will be more and more elderly groups everywhere. Senior citizens play an important role in society: they form families and are responsible for keeping family members connected to each other[1]. However, as the pace of social development is getting faster and faster, it is more and more common for seniors to live alone (either alone at home or with couples without children). These elderly people often suffer from serious loneliness problems due to the lack of attention from their families, which can have a significant impact on the seniors, families and even society[2]. Loneliness among the elderly has become increasingly serious.

This kind of loneliness and isolation may directly lead to the health problems of many elderly, which will have an impact on families and society. However, through the research on the living habits of the elderly, I found that the elderly always have their own medication plan, and medication management is a very important part of their daily life[3]. Many elderly people have family members who are responsible for helping them manage their medications: dispensing medications for the elderly, classifying medications for the elderly, and so on.I found that the action of reminding was actually very human, and family members' reminding was more effective for the elderly to take medicine[4].

2.2 REFERENCES:

[1] AishwaryaChawariya, PrajaktaChavan, AkankshaAgnihotri, “Fundamental Research on Medication Reminder System”, International Research Journal of Engineering and Technology, July 2019.
[2] Carl M. Rebman, Loreen M. Powell, “Building an Application for Custom Mobile Medication Reminders in Healthcare: An Exploratory Study”, Issues in Information Systems, 2018.
[3] Hassan B. M. Mohammed, Dogan Ibrahim, NadireCavus, “Mobile device based smart medication reminder for older people with disabilities”, Springer, 2018.
[4] Shivani Sharma, Katyayni Tyagi, Pooja Shishodia, “A medicine reminder application using android”, International Journal of Advance Research, Ideas and Innovations in Technology, 2018.

2.3 PROBLEM STATEMENT DEFINITION:

The main problem faced by senior citizen is they often get sick and have to regularly take medicines and the prescription of their medicine is very long as it is hard to remember to patients and also for their care giver. Also, Old age patients suffering from problems of forget to take pills on proper time which causes certain health issues for patients having Permanent diseases like diabetes, blood pressure, breathing problem, heart problems, cancer diseases etc. If they don’t take their medicine on time they may face consequences.

CHAPTER 3
IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS:

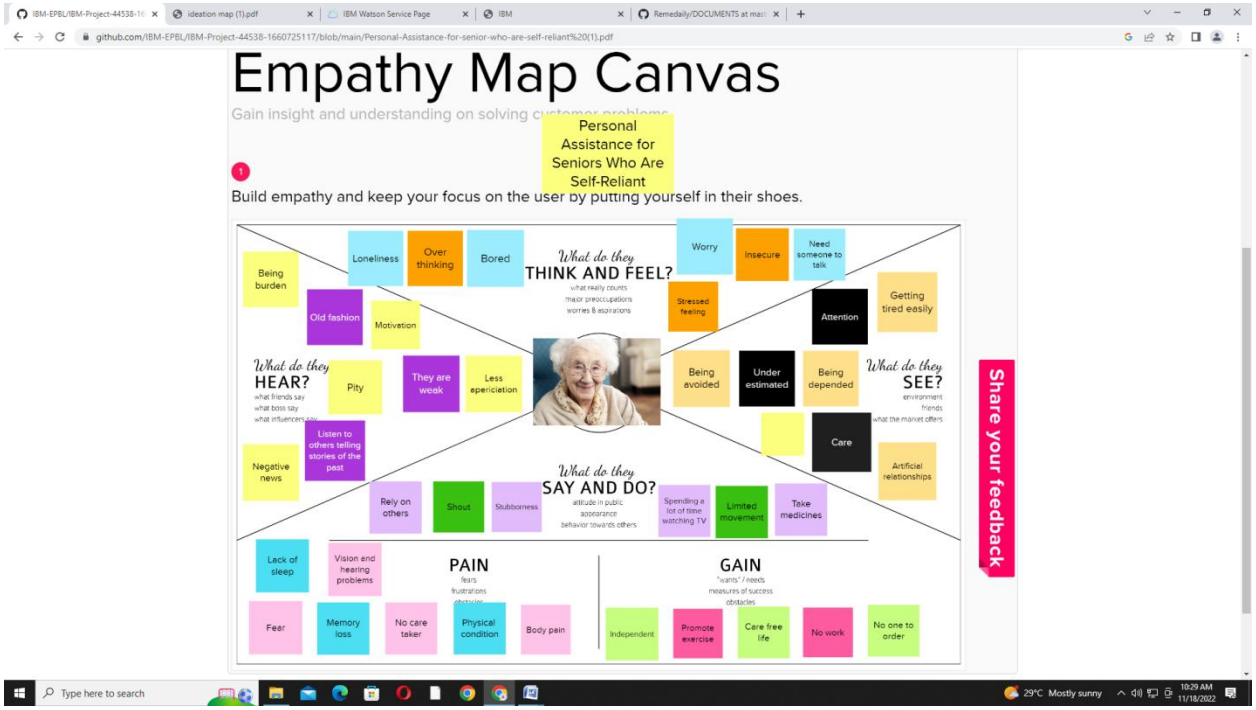


Fig 3.1: Empathy map

3.2 IDEATION AND BRAINSTORMING:

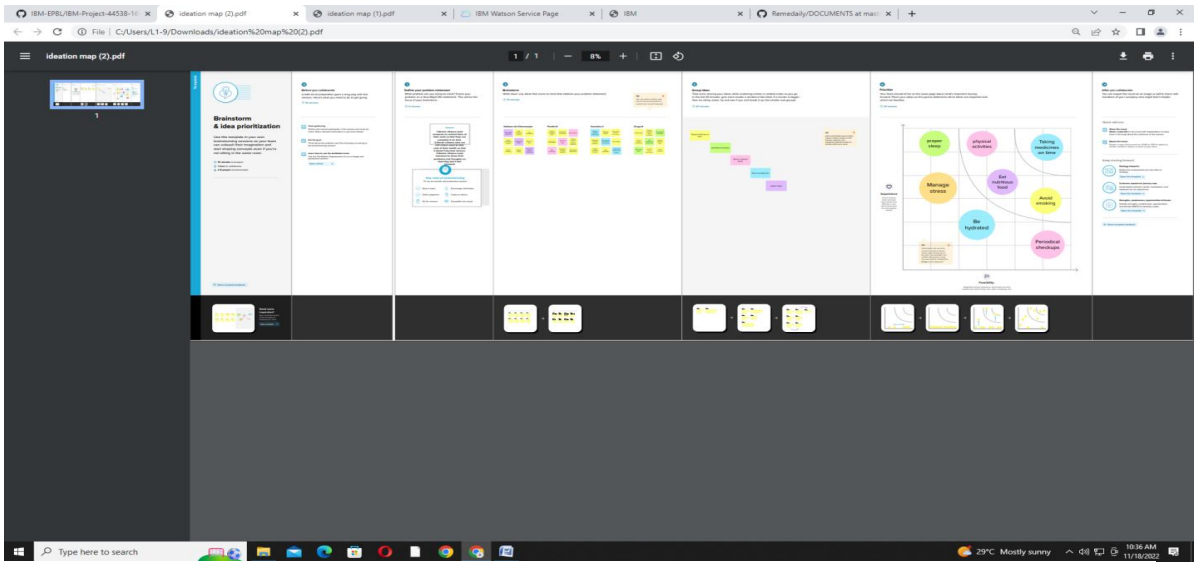


Fig 3.2: Ideation map

3.3 PROPOSED SOLUTION:

Table 3.1: Proposed solution

S. No.	Parameter	Description
•	Problem Statement (Problem to be solved)	Old peoples with or without comorbidities tend to take medicine on time. So that they need self -assistance to take their medicines on time.
•	Idea / Solution description	We'll be creating an application integrated with watch which alerts the old peoples by means of Pill reminder through a spam call or call from the concern hospital management.
•	Novelty / Uniqueness	Deaf people can easily remind the tablet time with the vibration in the smart watch
•	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
•	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.
•	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 PROPOSED SOLUTION FIT:

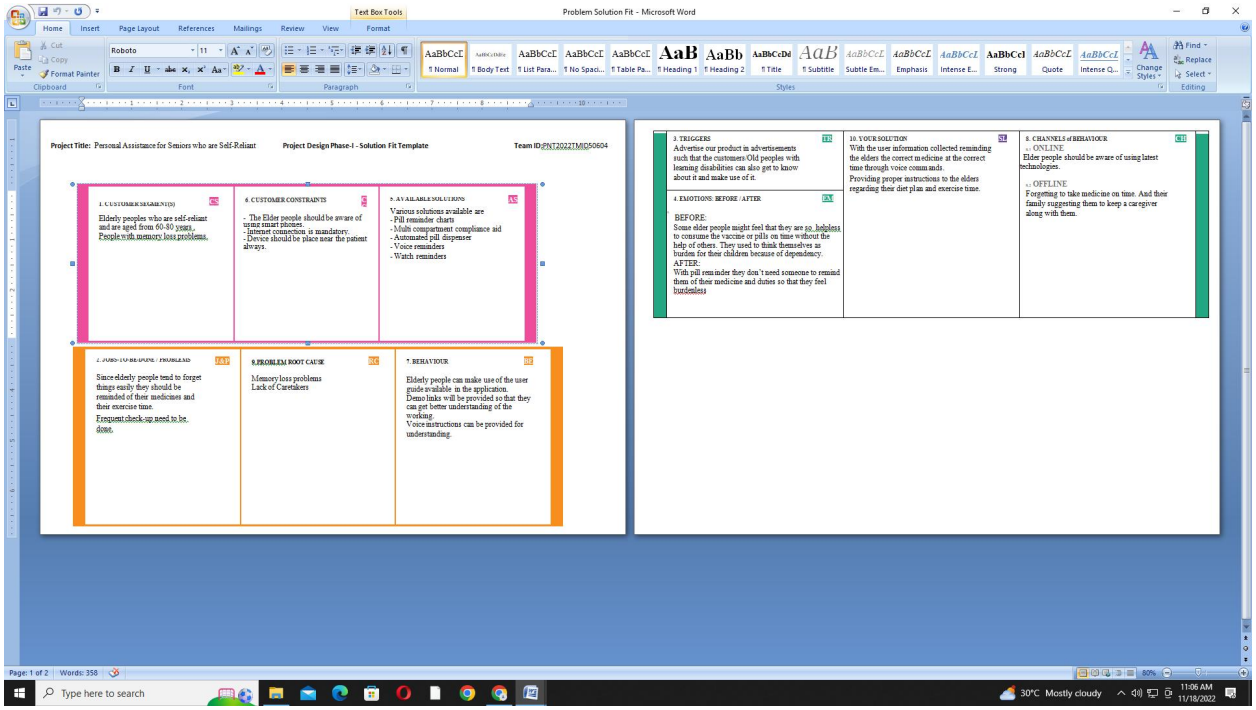


Fig 3.3: Proposed solution fit

CHAPTER 4
REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

Table 4.1: Functional requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Register through Application Register through Email and password Register through Website and installing the application
FR-2	User Login	Log into the application by entering email & password
FR-3	Database management	Storing the details of the medication person in the cloud
FR-4	User interface	User interacts with application easily
FR-5	Dashboard	User able to see the medicines and their timing schedule and also see the progress.
FR-6	Customer Care	Can login and check the status for providing required help.

4.2 NON-FUNCTIONAL REQUIREMENTS

Table 4.2: Non functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Availability of digital prescription doesn't require physical copy.
NFR-2	**Security**	As there is a access controls implemented, use of firewalls
NFR-3	**Reliability**	Data are saved in the secured server so they doesn't provide any loopholes for the hackers.
NFR-4	**Performance**	Design consideration for the performance of the application even many numbers of users access
NFR-5	**Availability**	Justify the availability of application
NFR-6	**Scalability**	Easily accessible application with high reliability.

CHAPTER 5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAM

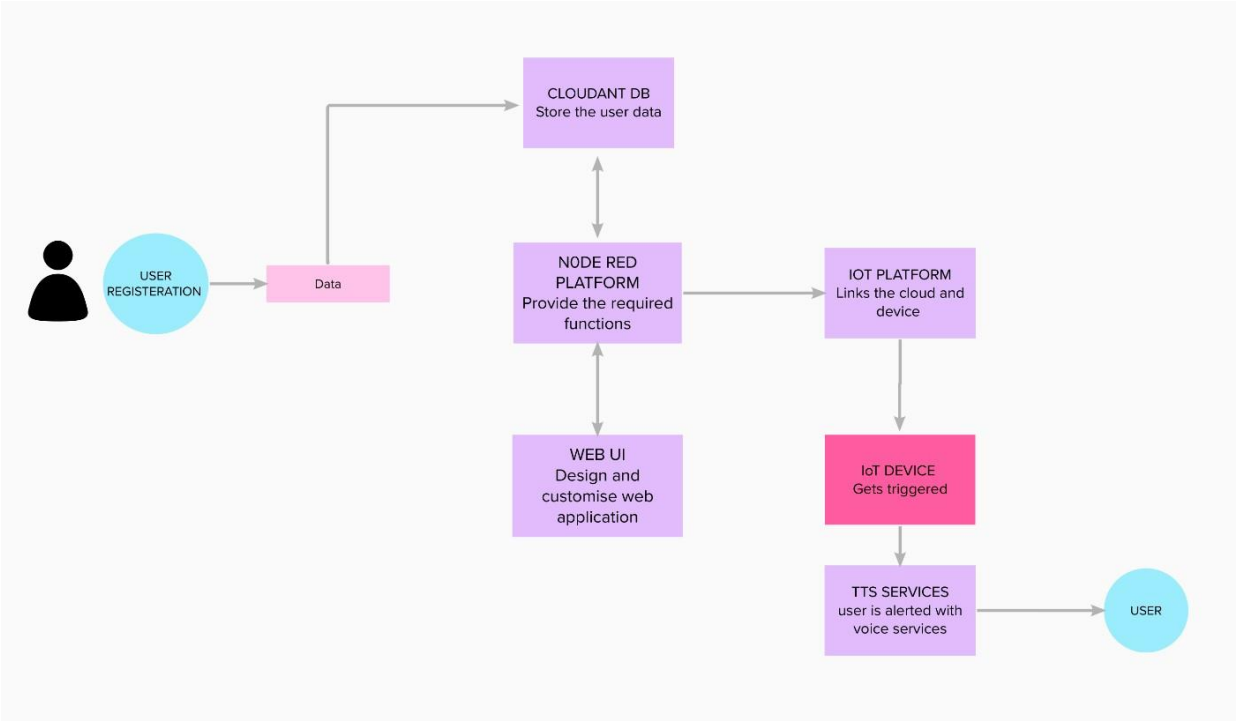


Figure 5.1: Data flow diagram

5.2 SOLUTION AND TECHNICAL ARCHITECTURE:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.
- It creates the overall technical vision for a specific solution to a business problem

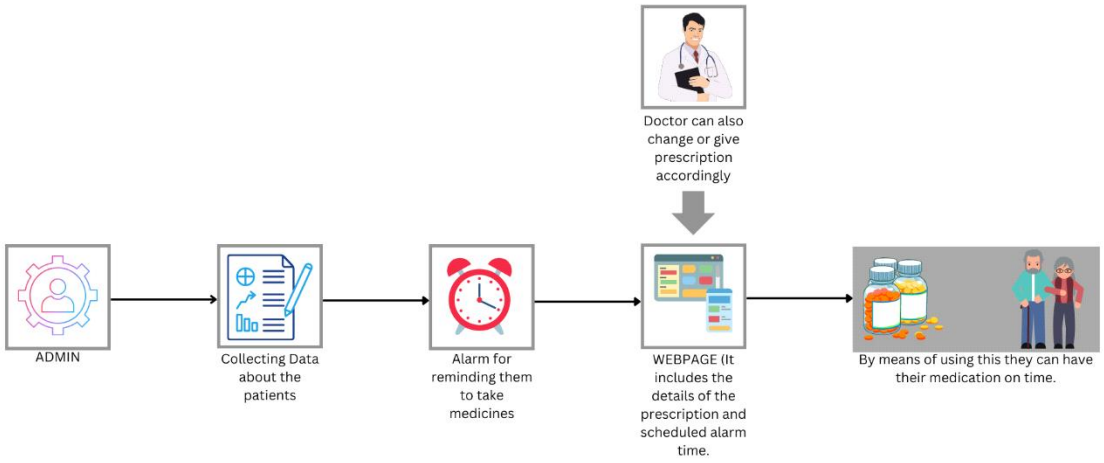


Figure 5.2: Solution architecture

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-1	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-2	As a user, I can register for the application through form.	I can register by new account	Medium	Sprint-1
	Login	USN-1,2	As a user, I can log into the application by entering email & password	I can able to view dashboard	High	Sprint-1
	Dashboard	USN-1,2	In the dashboard section, the user able to see the medicines and their timing schedule and also see the progress.	I can accessthe data	High	Sprint-2
Customer (Web user)	Login	USN-3	As a customer, I can register and access the application through app URL	can access my account	High	Sprint-2

Customer Care Executive	Dashboard	USN-4	As a customer care executive, I can login and check the status	I can login into the user account by user confirmation	Medium	Sprint-2
Administrator	Login	USN-5	As an Administrator, I can login into many user accounts and have control over them	I can login intouser account	High	Sprint-1
	Dashboard	USN-5	As an Administrator, I can access the user's database	I can access the user accounts and data	Medium	Sprint-2

CHAPTER 6
PROJECT PLANNING AND SCHEDULING:

6.1 SPRINT PLANNING AND ESTIMATION:

Table 6.1: Sprint planning

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1		US-1	Create the IBM Cloud services which arebeing used in this project.	6	High	Sadhana shri dharmarajan Durga.N Narmatha.U Preethi.N
Sprint-1		US-2	Configure the IBM Cloud services which arebeing used in completing this project.	4	Medium	Sadhana shri dharmarajan Durga.N Narmatha.U Preethi.N
Sprint-1		US-3	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices, so create the IBM Watson IoT platform.	5	Medium	Sadhana shri dharmarajan Durga.N Narmatha.U Preethi.N
Sprint-1		US-4	In order to connect the IoT device to the IBM cloud, create a device in the IBM Watson IoT platform and get the device credentials.	5	High	Sadhana shri dharmarajan Durga.N Narmatha.U Preethi.N
Sprint-2		US-1	Configure the connection security and createAPI keys that are used in the Node-RED service for accessing the IBM IoT Platform.	10	High	Sadhana shri dharmarajan Durga.N Narmatha.U Preethi.N
Sprint-2		US-2	Create a Node-RED service.	10	High	

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3		US-1	Develop a APPLICATION that reminds eldersto take their medicines.	7	High	Sadhana shri dharmarajan Durga.N Narmatha.U Preethi.N
Sprint-3		US-2	After that upload the information to the devicethat reminds them to take their medicine	5	Medium	Sadhana shri dharmarajan Durga.N Narmatha.U Preethi.N
Sprint-3		US-3	Publish Data to The IBM Cloud	8	High	Sadhana shri dharmarajan Durga.N Narmatha.U Preethi.N
Sprint-4		US-1	Create Web UI in Node- Red	10	High	Sadhana shri dharmarajan Durga.N Narmatha.U Preethi.N
Sprint-4		US-2	Configure the Node-RED flow to receive datafrom the IBM IoT platform and also use Cloudant DB nodes to store the received sensor data in the cloudant DB	10	High	Sadhana shri dharmarajan Durga.N Narmatha.U Preethi.N

6.2 SPRINT DELIVERY SCHEDULE:

Table 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	26 Oct 2022	02 Nov 2022	20	02 Nov 2022
Sprint-2	20	6 Days	02 Nov 2022	08 Nov 2022	20	08 Nov 2022
Sprint-3	20	6 Days	08 Nov 2022	14 Nov 2022	20	14 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

CHAPTER 7
CODING AND SOLUTIONING

7.1. Feature 1

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

7.2. Feature 2

- Login
- Wokwi

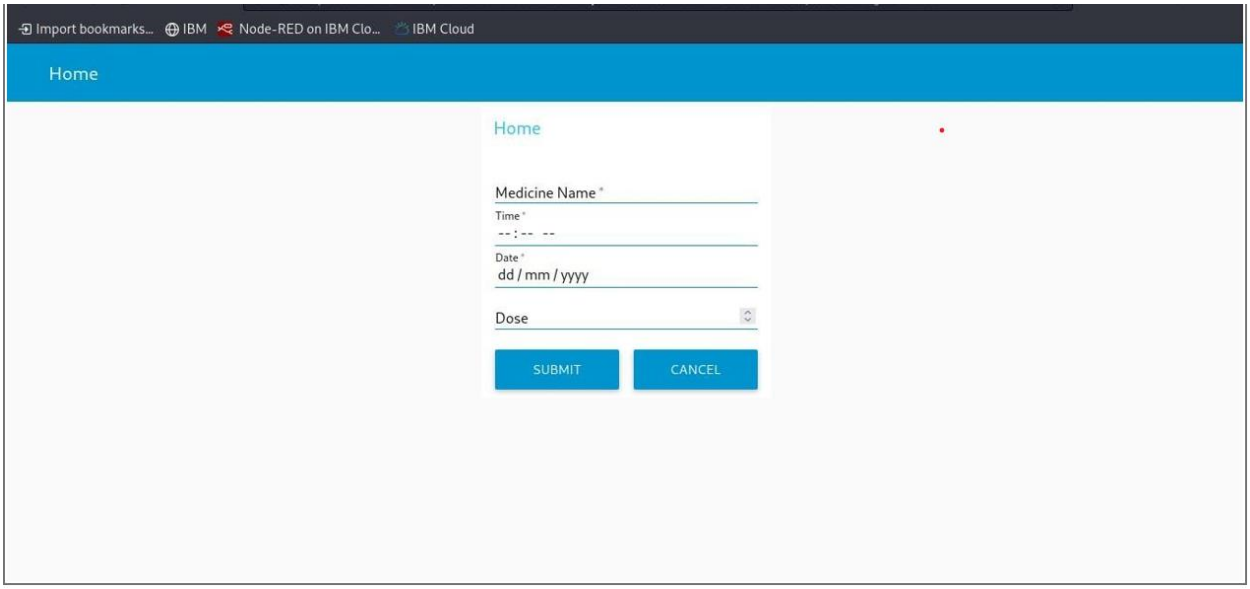
CHAPTER 8
TESTING:

TEST CASES:

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

Section	Total Cases	Not Tested	Fail	Pass
Login Page	5	0	0	5
Node Red Dashboard	32	0	0	32
IBM Watson IOT platform	2	0	0	2

TEST CASE 1:



USER ACCEPTANCE TESTING:

The main Purpose of UAT is to validate end to end business flow. It does not focus on cosmetic errors, spelling mistakes or system testing. User Acceptance Testing is carried out in a separate testing environment with production-like data setup. It is kind of black box testing where two or more end-users will be involved.

UAT is performed by:

• Client

• End use

Defect Analysis

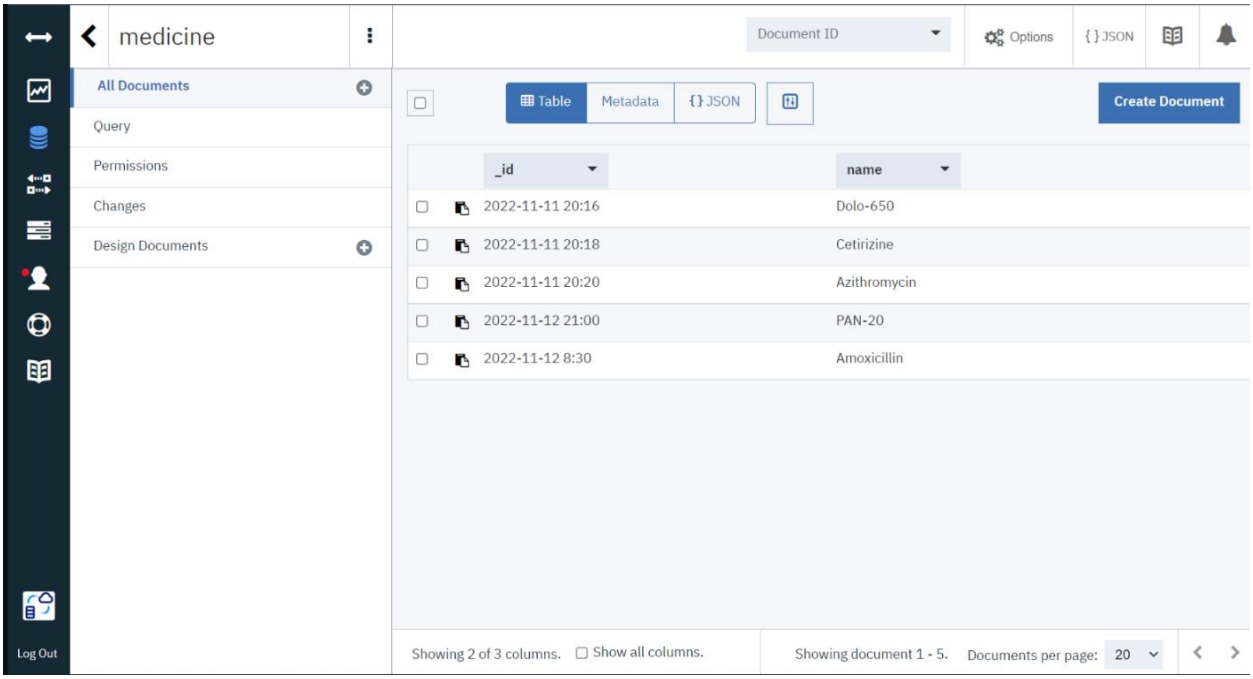
This report shows the number of resolved or closed bugs at each severity level, and how they were resolved.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	4	3	2	1	10
Duplicate	1	0	3	0	4
External	2	2	1	1	6
Fixed	4	3	5	19	31
Not Reproduced	1	0	1	1	3
Skipped	0	0	1	1	2

CHAPTER 9
RESULTS

PERFORMANCE METRICS:

An experiment is conducted on an elderly person who is in need of Personal Assistant Device and the following results are obtained, it shows the medicine reminder that gives the information regarding the intake of medicine by the person using the personal Assistant Device. The stored data in cloudant database on specified time alerts user with a voice message.



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 networks 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. 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 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 in to 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 sat around riding the Web, settling on telephone decisions or messing around. Some business clients whine of being "available to come in to work" when their colleagues and bosses can reach them whenever.

- Restricted in Scope

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

- Time constraint

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

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 the society. Drug use accounts for a large proportion in 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 due to not taking the medicines on time it 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 medicine reminder application will be of great use to the elderly peoples as they can be independent and live happily and healthily.

CHAPTER 13

APPENDIX

13.1 SOURCE CODE:

1.Python code for random medicine and time generating:

```
import json
import wiotp.sdk.device
import time
import random
myConfig = { "identity": {
"orgId": "dhhnmy",
"typeId": "sadhana",
"deviceId": "ibm"
},
"auth": {
"token": "Nane_Depp_3112"
}
}
client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()
for i in range(0,20):
    tablet=["Paracetamol","Aspirine","Azithral","Asthalin","Sinarest"]
    medicinetime=[12.00,1.00,2.00,3.00,5.00,18.00,20.00,7.00]
    name = "durga"
    medicine=random.choice(tablet)
    medicinetime=random.choice(medicinetime)
    mydata = {'Patient Name': name, 'Medicine Name': medicine, 'Time':
medicinetime} client.publishEvent("IoTSensor", "json", data=mydata, qos=0,
onPublish=None) print("Data published to IBM IOT platform :", mydata)
time.sleep(5)
 client.disconnect()
```

WOKWI SIMULATED CODE

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include <LiquidCrystal_I2C.h>
#include "DHT.h"// Library for dht11
#define DHTPIN 15 // what pin we're connected to
#define DHTTYPE DHT11 // define type of sensor DHT 11
#define LED 2
DHT (DHTPIN, DHTTYPE);// creating the instance by passing pin and typr of dht connected
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
```

```
//-------credentials of IBM Accounts------
#define ORG "64yf7x"//IBM ORGANITION ID
#define DEVICE_TYPE "b11m3edevicetype"//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "b11m3edeviceid"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "-&EMtr7l-v-Gz2G))e" //Token
String data3="";
int buzz= 13;
//-------- 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(0x27,32,2);
//-----------------------------------------
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()// configuring the ESP32
{
Serial.begin(115200);
dht.begin();
pinMode(buzz, OUTPUT);
pinMode(LED,OUTPUT);
delay(10);
Serial.println();
wificonnect();
mqttconnect(); }
void loop()// Recursive Function
{
if (!client.loop()) {
mqttconnect();
}
}
/*.....retrieving to Cloud.....*/
void PublishData(float temp, float humid) {
mqttconnect();//function call for connecting to ibm
}
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 = 13; i < payloadLength-2; i++) {
//Serial.print((char)payload[i]);
data3 += (char)payload[i];
}
Serial.println("Medicine Name: "+ data3);
if(data3 != "")
{
lcd.init();
lcd.print(data3);
digitalWrite(LED,HIGH);
tone(buzz, 100, 1000);
delay(2000);
digitalWrite(LED,LOW);
noTone(buzz);
delay(1000);
}
else
{
digitalWrite(LED,LOW);
}
data3="";
}
```

13.2 GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-44538-1660725117