Personal assistance for senior who are self reliant

PROJECT REPORT

Submitted by,

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CHAPTER 1

INTRODUCTION

1.1 ABSTRACT

A flexible and extensive digital platform for Self-reliant person is presented, exploiting the most advanced technologies of the Internet of Things, such as Radio Frequency Identification, wearable electronics, Wireless Sensor Networks, and Artificial Intelligence. Thus, the main novelty of the paper is the system-level description of the platform flexibility allowing the interoperability of different smart devices. This research was developed within the framework of the operative project HABITAT (Home Assistance Based on the Internet of Things for the Autonomy of Everybody), aiming at developing smart devices to support elderly people both in their own houses and in retirement homes, and embedding them in everyday life objects, thus reducing the expenses for healthcare due to the lower need for personal assistance, and providing a better life quality to the elderly users.

1.2 INTRODUCTION:

The Internet of Things (IoT) is helping society facilitate a major challenge of meeting the

needs of an ageing population. The UK will see a massive 23% increase in those aged 65+ between 2010 and 2018. By 2035, numbers of people aged 65+ will rise by just under 7 million – from 11 to 16.9 million. In 1908 1% of the population was expected to reach their 100th birthday but since 2012, this has risen to 1 in 3. As people live longer, they will inevitably suffer from a greater number of health issues. Care homes are expensive – an average of £2000 a month – and many would prefer to stay independent in their own home. The main issue here is safety, and family members may have to stop working to provide care if they cannot afford home nurses. As technology improves, IoT can help eliminate these issues. Data collected from IoT devices formulates an individual's daily story by monitoring their routine, picking up inconsistencies and alerting emergency services if necessary. Connected IoT devices in the home improve safety, with experts projecting sales of 50 million wireless consuming devices for monitoring health by 2017, the smart home is here to stay.

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING PROBLEM:

The author describes [1] Canadian Study of Health and Aging (CSHA) and the National Population Health Survey (NPHS) collected data on the prevalence of dementia in differing fashions. The CSHA used a two-stage method with objective testing and expert judgment, and the NPHS used self-report and proxy data. The present report compares estimates of prevalence and the methodology for ascertainment in the two surveys. The more detailed approach of the CSHA offers the more valid means of estimating prevalence and providing data on subtypes, and can be used in natural history studies. The NPHS measures, including a self/proxy report of diagnosed dementia and a derived cognitive measure, are not sufficiently valid for useful inferences to be made. However, the NPHS method can be improved through supplementation with data on functional disability, providing age group-specific point estimates closer to the CSHA's estimates of cognitive impairment and dementia from the community sample. Future waves of the NPHS may wish to include objective cognitive function measures as a cost-efficient and more accurate method of estimating the prevalence of the dementia syndrome without attempting to estimate the prevalence of particular causes of that syndrome.

2.2 REFERENCES:

1. Thomas, V. S., Dwarves, S., MacKnight, C., & Rockwood, K. (2001). Estimating the prevalence of dementia in elderly people: a comparison of the Canadian Study of Health and Aging and National Population Health Survey approaches. *International Psychogeriatrics*, *13*(S1), 169-175.

2. van Kesteren, Y.; Bradford, D.; Zhang, Q.; Karunanithi, M.; Ding, H. Understanding SmartHome Sensor Data for Ageing in Place Through Everyday Household Routines: A Mixed Method CaseStudy. JMIR Mhealth Uhealth 2017, 5, e52. [CrossRef] [PubMed]

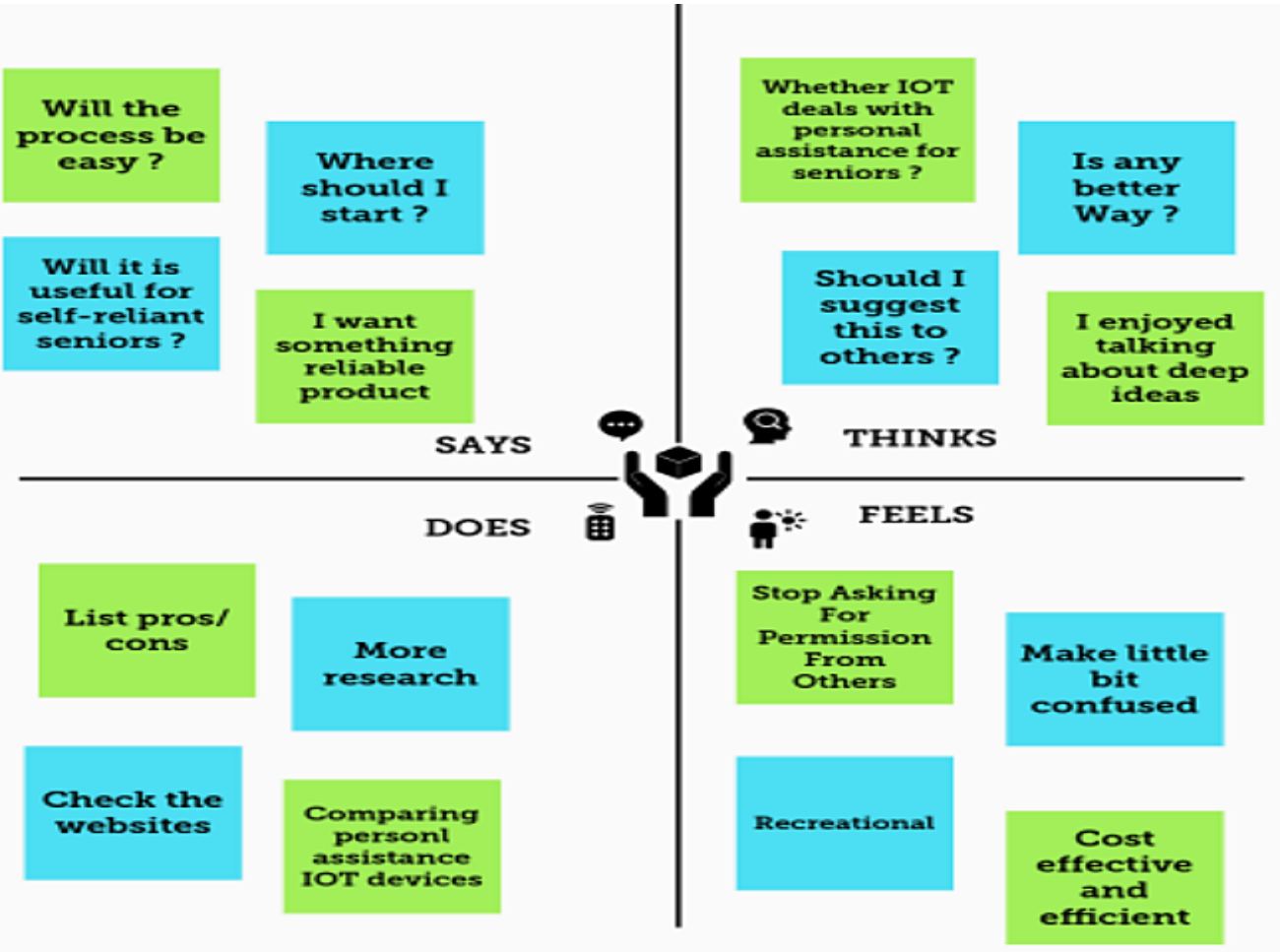
3. Kalache, A.; Gatti, A. Active ageing: A policy framework. Adv. Gerontol. 2003, 11, 7–18. [PubMed]

2.3 PROBLEM STATEMENT DEFINITION

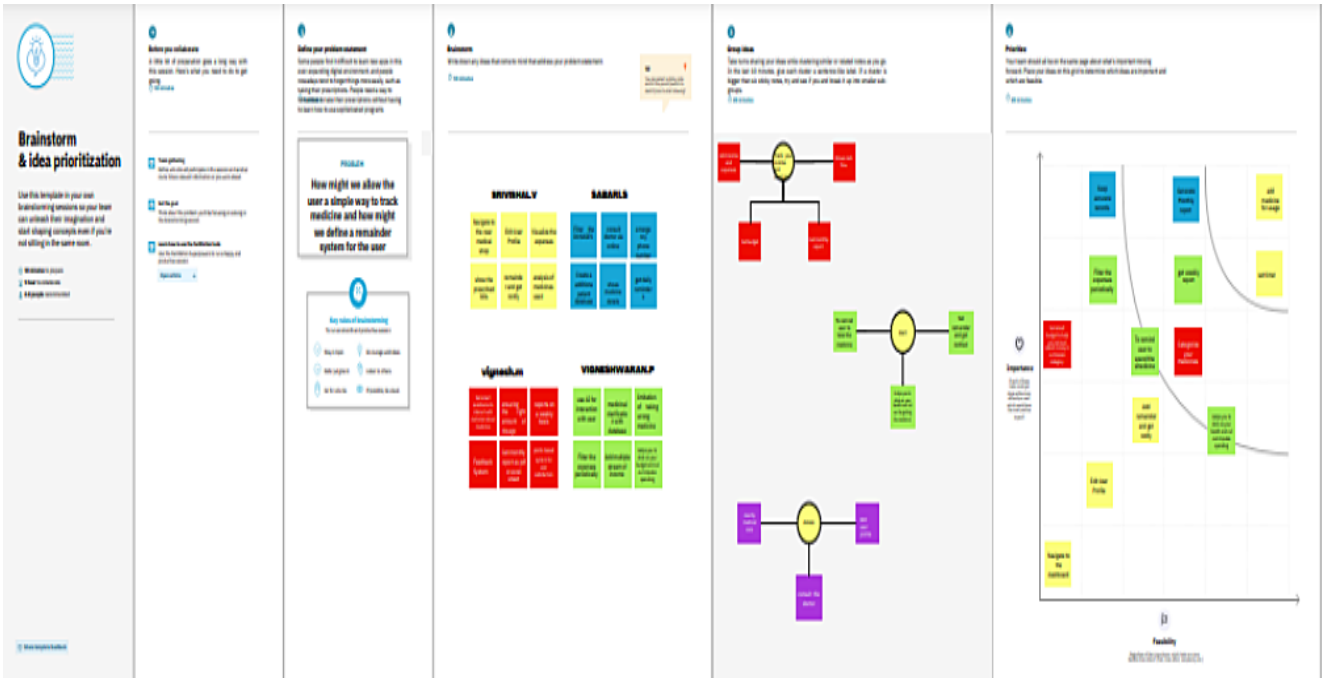
It is very difficult for the senior citizens (elder people) to remember their medicines. To avoid the skipping up the medicines,they can be remembered by using the voice commands of the medicine names at correct time specified. If the voice commands on the medicine name is not available, they are given the reminder of the medicine by SMS on their phone or to their closest person.

CHAPTER 3
IDEATION AND PROPOSED SOLUTION

3.1EMPATHY MAP CANVAS



3.2 IDEATION AND BRAINSTORM

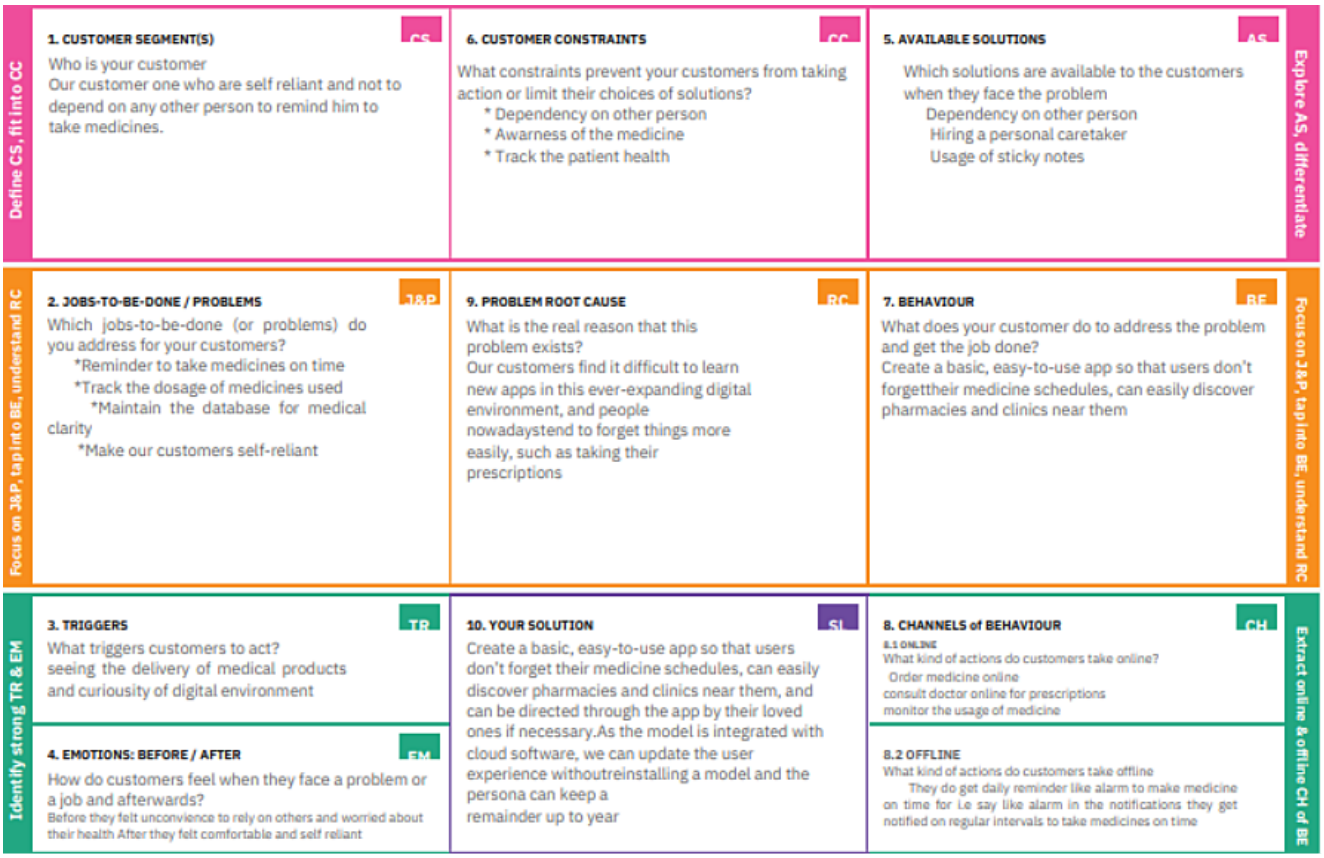


3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to besolved)	Some people find it difficult to learn new apps in this ever-expanding digital environment, and people nowadays tend to forget things more easily, such as taking their prescriptions. Peopleneed a way to remember to take their prescriptions without having to learn how to usesophisticated programs.
2.	Idea / Solution description	Create a basic, easy-to-use app so that users don't forget their medicine schedules, can easily discover pharmacies and clinics near them, and can be directed through the app by their loved ones if necessary.
3.	Novelty / Uniqueness	My research began with a series of inquiries directed at a variety of people in order to have a better understanding of their issues and demands in remembering their routines. The purpose of this study was to gain a better understanding of individuals and their needs, as well as to put them at the centre of our design process and product.
4.	Social Impact / Customer Satisfaction	I constructed these proto-personas, or names, based on the research findings from the user interview. They would be crucial to the rest of the design process. All design decisions may be assessed and re-evaluated using these personas, keeping the user and their perspective in mind.
5.	Business Model (Revenue Model)	By using the model, we can collect basic and some medical information about the persona that helps us in showing relevant and profitable advertisements.

6.	Scalability of the Solution	As the model is integrated with cloud software, we can update the user experience without reinstalling a model and the persona can keep aremainder up to year.

3.4 PROBLEM SOLUTION FIT



CHAPTER 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 Registration through Phone Number
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP Confirmation via Messages
FR-3	User Security	Enable password security Authorization process available
FR-4	User Interface	Simple User Interface Easy to Understand
FR-5	System Performance	Easy to use without lagging and good performance
FR-6	Tracking	It should contain a history of usage

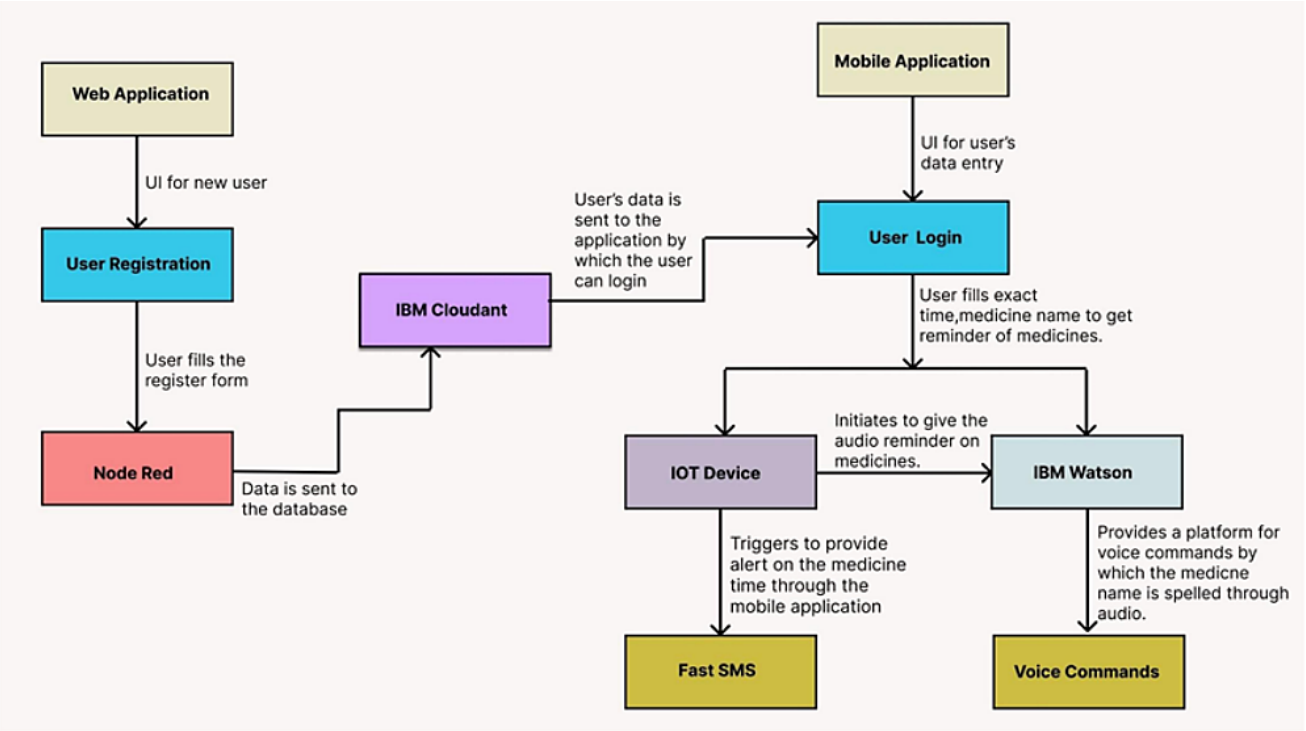
4.2 NON FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	It contains a good user interface to every one
NFR-2	**Security**	It contains a password for authorization
NFR-3	**Reliability**	This should be error free and without bug to use
NFR-4	**Performance**	It contains a good performance
NFR-5	**Availability**	It should be available to both online and offline mode
NFR-6	**Scalability**	It should be scalable when more of users working in the application

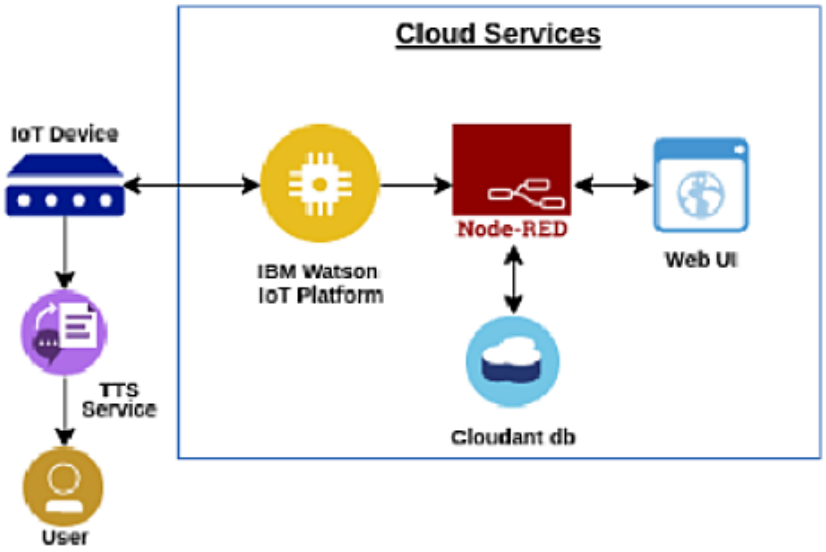
CHAPTER 5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAM



5.2 SOLUTION & TECHNICAL ARCHITECTURE



5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming mypassword.	I can access my account / dashboard	High	Sprint-1

		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email & password		High	Sprint-1
	Dashboard	USN-5	As a user, I can able to understand the user Interface it should not be a complex interface		High	Sprint-1
Customer (Web user)	Login	USN-6	I can able to login in by a application user by login id and password	I can receive notifications.	High	Sprint-1

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 Members
Sprint-1	IBM Watson IOTplatform	USN-1	Creating devices and board and generatingdata	1	medium	SHRI VISHAL VIGNESH M VIGNESHWARAN P SABARI S
Sprint-2	Storing Data usingnode-red	USN-2	Storing the data in IBM Cloudant DB through node-red functions	2	High	SHRI VISHAL VIGNESH M VIGNESHWARAN P SABARI S
Sprint-3	IoT device/ MicrocontrollerBoard	USN-3	The board connect with the cloud and retrievethe information and remain the peoples	2		SHRI VISHAL VIGNESH M VIGNESHWARAN P SABARI S
Sprint-4	Reminder (TTS)	USN-4	Getting the speech reminder to users to taketheir	1	High	SHRI VISHAL VIGNESH M VIGNESHWAR

			tablet			AN P SABARI S

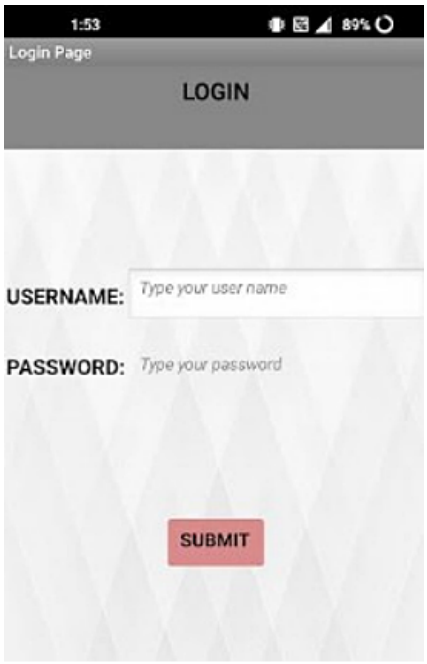
6.2 SPRINT DELIVERY SCHEDULE

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned EndDate)	Sprint ReleaseDate (Actual)
Sprint-1	20	6 Days	19 Oct 2022	25 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	30 Oct 2022	04 Nov 2022	20	31 Oct 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	07 Nov 2022
Sprint-4	20	6 Days	13 Nov 2022	18 Nov 2022	20	14 Nov 2022

1. **Coding and Solutioning**

7.1 Feature 1

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

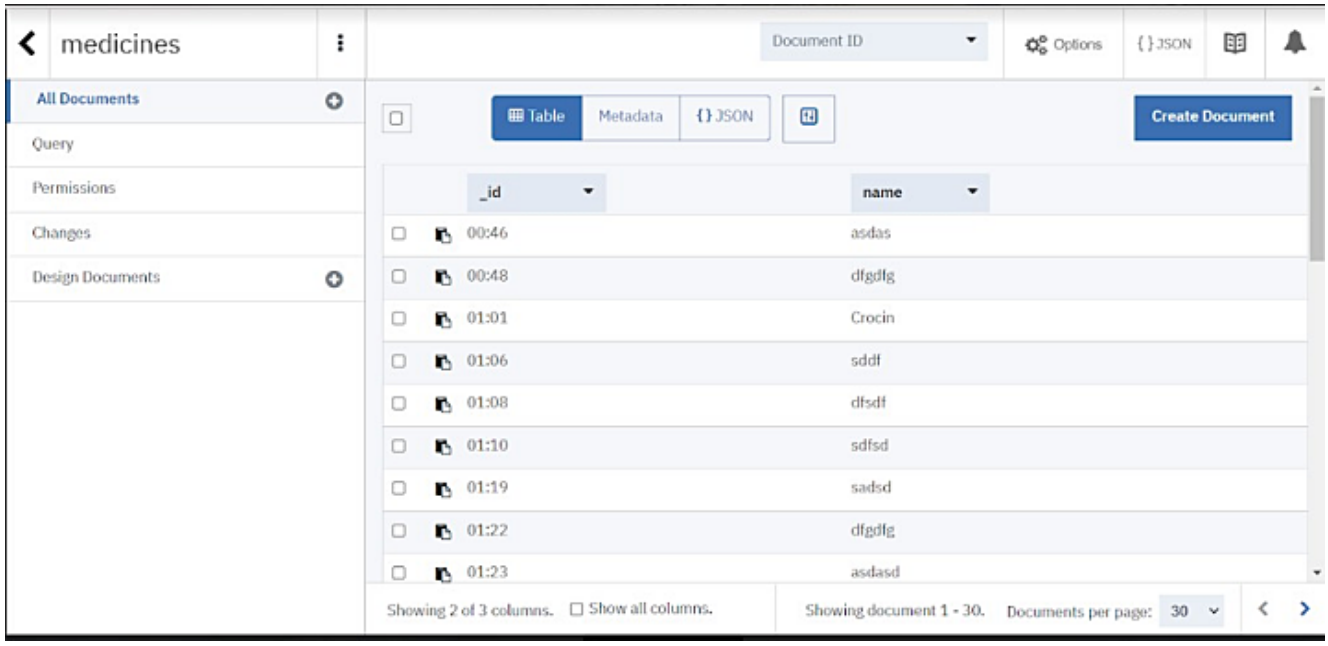


7.2 Feature 2

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

7.3. Feature 3

The project includes a cloud database system.



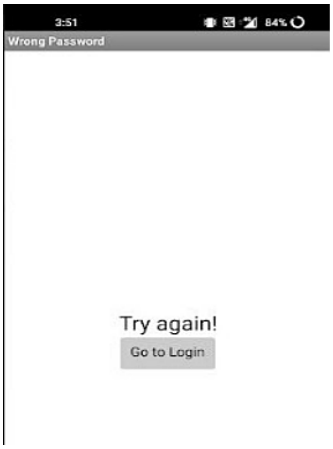
8.1 Test cases

Test case	Precondition	Test steps	Test data	Expect edresult

Verify login with valid credentials	User should have a network connection	1. Launch URL 2. Enter valid username. 3. Enter valid password. 4. Click on the “Login” button.	Username: Navya Password: 12345	Users should be able to login successfully.
Verify login with invalid credentials	User should have a network connection	1. Launch URL 2. Enter valid username. 3. Enter invalid password. 4. Click on the “Login” button.	Username: Navya Password: Navya123	Users should not be able to login.
Update the medicine name with the time.	User should have a network connection	1. Enter valid medicine name. 2. Enter the time when the medicine has to be consumed. 3. Click on the “Submit” button.	Medicine Name: Cetirizine Medicine Time: 20.00	Users should be able to update it successfully.

8.2 User acceptance testing

Login page testing **Incorrect login attemp**



Medicine page testing

Results

9.1 Performance Metrics

S. NO	Parameter	Performance
1.	Response Time	0.2s (Average of 10 trials)
2.	Workload	500 users (Calculated based on Cloud Space)
3.	Revenue	Individual users and pharmaceutical industries.
4.	Efficiency	Simple and straightforward workflow, which makes theprocess efficient.
5.	Down Time	Almost no down time due to IBM Cloud enabledsolution.

Advantages

- Help the elderly people to take their medicine at the correct time.
- Avoid personal assistants or caretakers needed for medically sick people.
- Cost efficient.
- Can store multiple data and many notifications can be generated.
- Since it includes voice assistance, even blind people can use our device.

Disadvantages

- Makes people lethargic and makes them dependent always on others.
- Requires a stable internet connection.

Conclusion

The project offers the elderly or medically sick people a personal assistant which reminds them of the medicines to be consumed at the particular time. Skipping tablets may lead to serious problems if the person has a severe illness and this can be avoided. Since the cloud is integrated with the mobile application, numerous data can be fed into the database and notifications can be generated. The mobile application developed is highly customisable by the user and easy to use.

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.

APPENDIX SOURCE CODE:

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt #include
"SoundData.h"
#include "XT_DAC_Audio.h"
XT_Wav_Class Sound("voice_command.wav"); XT_DAC_Audio_Class
DacAudio(2,0); uint32_t DemoCounter=0;


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

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

```
#define ORG "ut4tn5"//IBM ORGANITION ID
#define DEVICE_TYPE "Arduino"//Device type mentioned in ibm watson IOT Platform #define DEVICE_ID "nitish123"//Device ID mentioned in ibm watson IOT Platform #define TOKEN "123456789"   //Token
String data3; float h, t;


//-------- Customise the above values --------
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Server Name
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of event perform and format in which data to be send
char subscribetopic[] = "iot-2/cmd/test/fmt/String";// cmd command type AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth";// authentication method char token[] = TOKEN;

            char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id


//
WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, callback ,wifiClient); //calling the predefined client id by passing parameter like server id,portand wificredential
void setup()// configureing the ESP32
{
Serial.begin(115200);

delay(10); Serial.println(); wificonnect(); mqttconnect();
}
```

```
24
25 void loop()// Recursive Function
26 {
27
28
29
30
31 delay(1000);
32 if (!client.loop()) { mqttconnect();
33 }
34 }
```

/*.....retrieving to Cloud*/

```
1  void mqttconnect() {
2  if (!client.connected()) { Serial.print("Reconnecting client to ");
   Serial.println(server);
3  while (!!!client.connect(clientId, authMethod, token)) {
4
5                  Serial.print("."); delay(500);
6  }
7
8  initManagedDevice(); Serial.println();
9  }
10 }
11 void wificonnect() //function defination for wificonnect
12 {
13 Serial.println(); Serial.print("Connecting to ");
14
15 WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to
   establish the connection
16 while (WiFi.status() != WL_CONNECTED) { delay(500);
17 Serial.print(".");
18 }
19 Serial.println(""); Serial.println("WiFi connected");
   Serial.println("IP address: "); Serial.println(WiFi.localIP());
```

```
20
21 }
22
23 void initManagedDevice() {
24 if (client.subscribe(subscribetopic)) {
   Serial.println((subscribetopic)); Serial.println("subscribe to cmd
   OK");
25 } else {
26 Serial.println("subscribe to cmd FAILED");
27 }
28 }
29
30 void callback(char* subscribetopic, byte* payload, unsigned int
   payloadLength)
31 {
32
33 Serial.print("callback invoked for topic: ");
   Serial.println(subscribetopic);
34
35 for (int i = 0; i < payloadLength; i++) {
36 //Serial.print((char)payload[i]); data3 += (char)payload[i];
37 }
38
39 Serial.println("data: "+ data3); if(data3=="announce")
40 {
41 Serial.println(data3); for(int i=0;i<5;i++){ DacAudio.FillBuffer();
   if(Sound.Playing==false)
42 DacAudio.Play(&Sound); Serial.println(DemoCounter++);
43 }
44 }
45
46 else
47 {
48 pass;
49
50 }
51 data3="";
52
53
54 }
```

```
55
```

GITHUB LINK :: https://github.com/IBM-EPBL/IBM-Project-43746-1660719180

YOUTUBE LINK :: https://www.youtube.com/watch?v=45_KfjXATtE