Personal Assistance for Seniors Who Are Self-Reliant

A PROJECT REPORT

Submitted By

KAVITHA S

VANITHA A

NAMBI NANDHINI S

VIJAYA DIWAHARAN C

in partial fulfillment for the award of the degree

of

Bachelor of Engineering

IN

Computer Science and Engineering

GOVERNMENT COLLEGE OF ENGINEERING – TIRUNELVELI

ANNA UNIVERSITY: CHENNAI 600 025

DECEMBER-2022

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report "**Personal Assistance for Seniors Who Are Self –Reliant**" is the bonafide work of "**KAVITHA S, VANITHA A,NAMBI NANDHINI S, VIJAYA DIWAHARAN C**" who carried out the project work under my supervision.

SIGNATURE,

Dr. G. TAMILPAVAI, M.E., Ph.D., Tmt.

HEAD OF THE DEPARTMENT,

Dept. of Computer Science and Engg.

Government College of Engineering,

Tirunelveli-627007.

SIGNATURE,

G. SONA, M.E.,

ASSISTANT PROFESSOR,

Dept. of Computer Science and Engg.

Government College of Engineering,

Tirunelveli-627007.

TABLE OF CONTENTS

TABLE OF CONTENTS

1.INTRODUCTION:

1.1.PROJECT OVERVIEW:

The senior population increases and becomes more digitally connected, Internet of Things (IoT) solutions that enable this demographic to live independently will become more important than ever. According to the Centers for Disease Control and Prevention, falls are the leading cause of injury and death among older adults. Connecting IoT devices (such as motion sensor Mini, window sensor, emergency button, smart alarm or smart plug Mini) to a gateway can monitor the behavior of older adults, remotely control the device and enable them to call for help in an emergency. IoT devices can provide seniors and people who need special care with reliable and accessible convenience. All of the technology we've mentioned can help older people to improve their physical and mental well-being, as well as their social lives. Apps and social media can help to prevent loneliness, whilst the internet can help make it easier to shop and to manage your bills.

1.2.PURPOSE

IoT enables healthcare professionals to be more watchful and connect with the patients proactively. Data collected from IoT devices can help physicians identify the best treatment process for patients and reach the expected outcomes.

The goal behind the Internet of things is to have devices that self report in real-time, improving efficiency and bringing important information to the surface more quickly than a system depending on human intervention. It makes everything connected and the data sample size is expanded even more for things like how much time you spend doing something, which in turn makes all that data more accurate. The future of IoT has the potential to be limitless. Advances to the industrial internet will be accelerated through increased network agility, integrated artificial intelligence (AI) and the capacity to deploy, automate, orchestrate and secure diverse use cases at hyperscale.

2.LITERATURE SURVEY :

2.1. EXISTING PROBLEM :

Elderly people let slip the medications at the correct time and the existing solutions for this problem is setting reminders or using pill boxes,calendars,Personal Assistance.Though the solutions give reminders,the voice commands or assistance given by this system is more efficient.

*2.2.*References

1.)Self-Reliant Community Development in a Semi-Urban Area of Bangkok: A Case Study of Community Well-Being(2021) Suparp Thaithae, Araya Chiangkhong,Parinyaporn Thanaboonpuang.

2.)Self-Reliance, Mental Health Need, and the Use of Mental Healthcare Among Island Puerto Ricans(2002)Alexander N. Ortega & Margarita Alegría

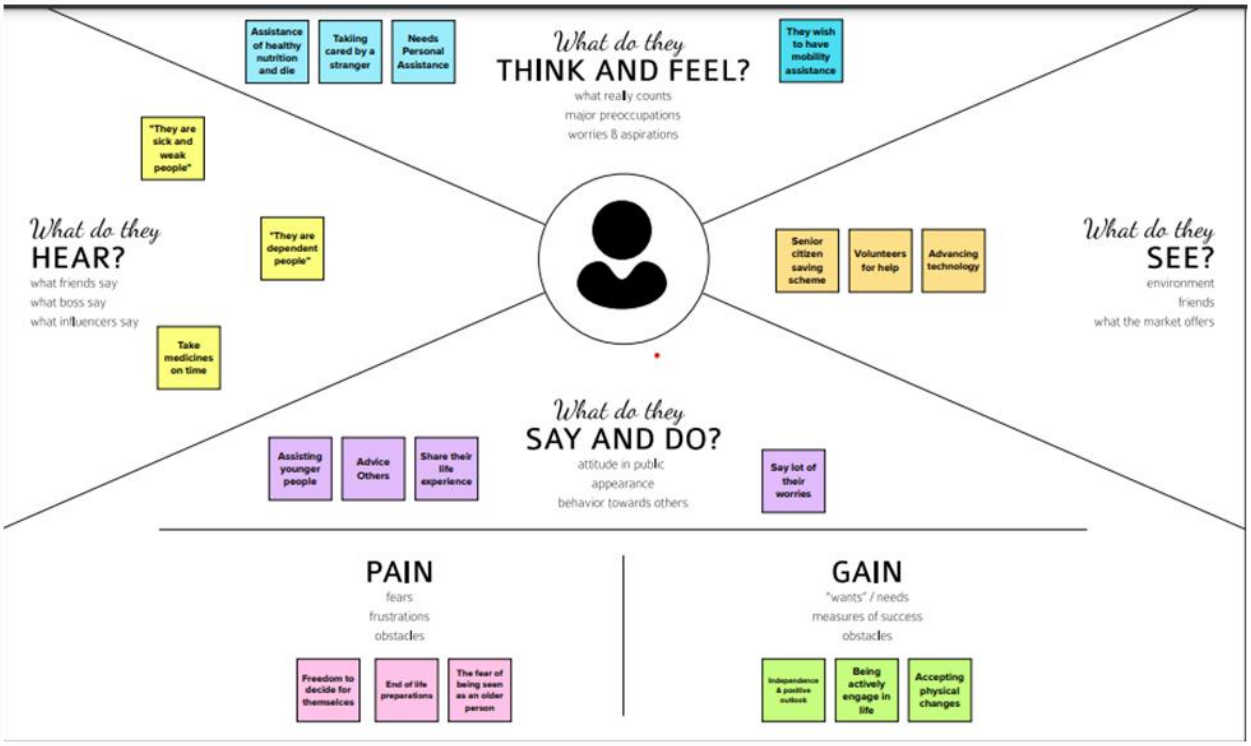
3.)Self-Reliance and Military Service Training Outcomes.James Campbell Quick,Janice R. Joplin,Debra L. Nelson,A. David Mangelsdorff&Edna Fiedler.

2.3.Problem Statement Definition

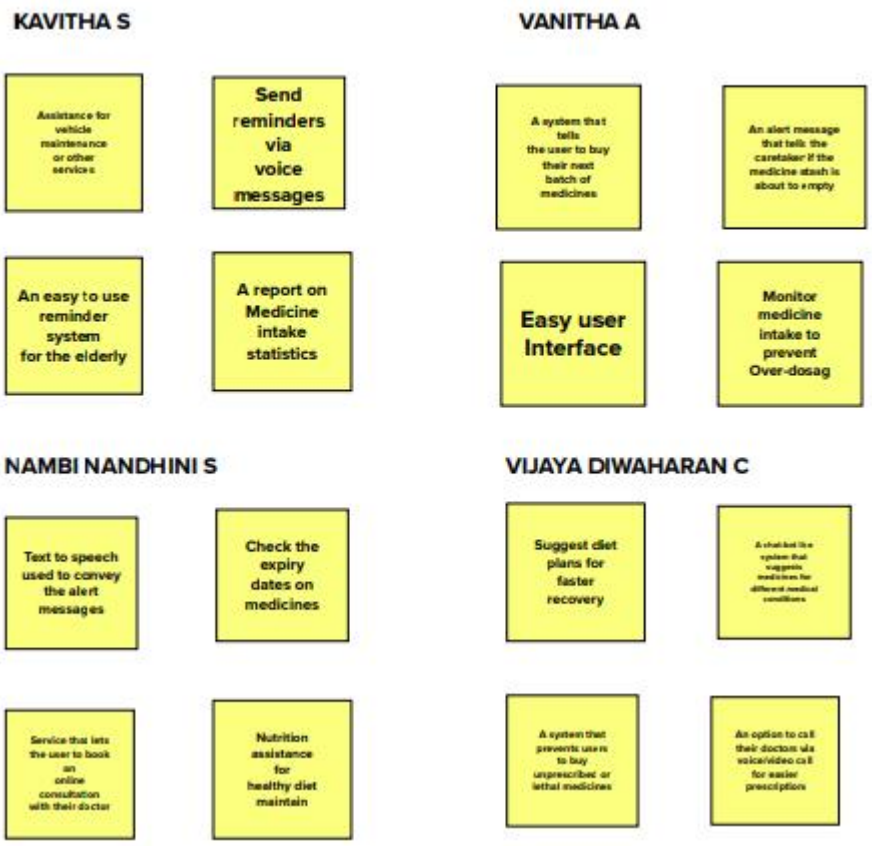
Skipping medicines can be serious for some medical health conditions; Sometimes elderly people forget to take their medicine at the correct time. They also forget which medicine one should take at that particular time. And it is difficult for Doctors/Caretakers to monitor the patients around the clock.

3.IDEATION AND PROPOSED SOLUTION

3.1.Empathy Map Canvas



3.2.Ideation and Brainstorming



3.3.Proposed Solution

Proposed Solution Template:

S.No.	Parameter	Description
1.	ProblemStatement(Problemtobe solved)	Sometimes elder people forget to take the medicine at the required time of medicines. And also forgets which medicine He/She have to take at required time. And it is difficult for Caretakers to monitor them around the clock. To avoid this problem, we have made this medicine reminder system
2.	Idea/Solutiondescription	The ageing of a population increases the quantity of elders dependent in self-care. Thus, being dependent in a very home context could be a undeniable fact that deserves attention from social support entities integrated into the community, like nursing homes, which play a central role in supporting the families involved. Therefore, the planning and development of an archetype of a replacement system is proposed, which main objectives are to accompany, teach, and share information between its users, taking under consideration safe medical validation and ethical issues, through emerging health ICT technologies. This archetype may be a reinforcement, that is, how to push and complete the knowledge and skills to house elders' well-being and health, also as their informal caregivers' welfare.

3.	Novelty/Uniqueness	An intervention called CAPABLE -- for Community Aging in Place, Advancing Better Living for Elders -- involves home visits with an occupational therapist, a registered nurse, and a handyman to work together with older adults to identify mobility and self-care issues in their homes and fix or modify them.implementing a system that helps the client remember to take medicines at the proper time each day, CAPABLE makes it more likely that older adults will be able to stay in their homes longer, improving health outcomes and decreasing medical costs.
4.	SocialImpact/CustomerSatisfaction	Personal assistants do not administer or manage medications, but they can remind your parent to take medicines when the time comes. Since many elderly forget to take medicines—or wind up taking double or triple doses—having someone there to remind them and monitor medications can prove invaluable. Mom and dad get the help

3.4.Problem solution fit

1.CUSTOMER SEGMENT(S)	5. AVAILABLE SOLUTIONS	6. CUSTOMER CONSTRAINTS
Who is your customer? Who is your customer? Senior Citizens who are self reliant are the target customers.	Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? In the past practicing heart healthy lifestyle choices such as exercising, eating a Mediterranean diet, avoiding stress. These are temporary solutions and cannot lead an independent life. Our device promotes their lifestyle by being available all the time with a helping hand	What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices. The customer must not be hearing impaired since the application will give the voice commands about the medicine and the internet connection is mandatory. A android or an ios device is needed

		customers take offline? Extract offline channels from and use them for customer development. The data is also stored in the device so when they go away from the care givers they can survive easily and live a healthy
3. TRIGGERS What triggers customers to act? i.e. seeing their neighbor installing The senior citizen always find it difficult to take medicines at the prescribed time due to complications that come with old age. The main problem of not taking medicine on time is that it will affect the health and wellbeing and is difficult for the caretakers. **4. EMOTIONS: BEFORE / AFTER** How do customers feel when they face a problem or a job and afterwards? Before using it the senior citizens and their caretakers are under constant panic mode about the consumption of medicine in its correct measures. Now after this application it became easy for every one and both elders and the care givers can gave a peaceful and stress free day.	**9. PROBLEM ROOT CAUSE** What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. Forgetfulness of the elders are the root cause along with the confusion on how much to consume, when to consume, and what medicine to take.	**10. YOUR SOLUTION** If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behavior. The memory issue that comes with age happens to be an issue reminding them frequently often tends to do the deed and this application reminds them via a voice note and many senior citizens might be illiterate or lost the ability to read find it easy.

4.Requirement Analysis

4.1.Functional Requirements

FR No.	Functional Requirement	Description
FR-1	Frond End - Node Red	It allows to connect Arduino devices & it mostly for web apps, API & services.
FR-2	Back End - Python	It is used by the developers can be used to build your personal Assistant to perform task designed by the user
FR-3	Database - Cloud	It is used to store the medicine that the user should be taken.
FR-4	Hardware - Arduino	It help to remind the user by using alarm.

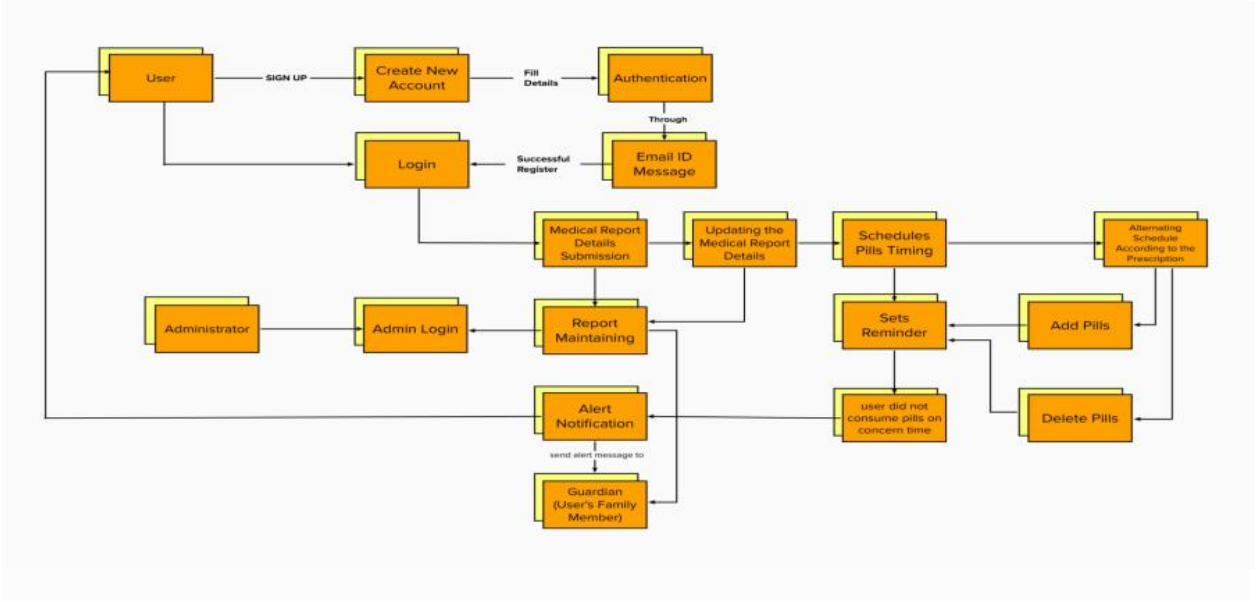
4.2.Non-functional Requirements

FR No.	Non-functional Requirement	Description
NFR-1	Usability	The effectiveness, efficiency and satisfaction with which specific users can achieve a specific set of tasks in a particular environment.
NFR-2	Performance	Performance measurements include: ➢ Quality and efficiency of Senior care. ➢ Give Effective services. ➢ Disparities in performance Care outcomes.
NFR-3	Flexibility	The user update their medicine with time in database that helps to easily remind the user to take medicine.
NFR-4	Time Remainder (Alarm)	To remind the users to take medicines on time and alert the user when notification and automatic

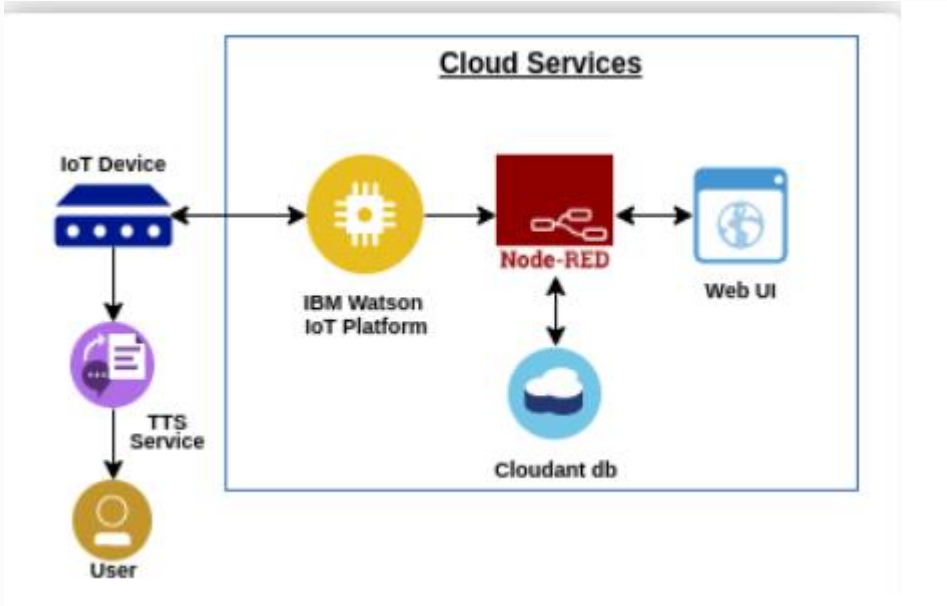
		alarm ringing system.
NFR-5	**Proper medication**	Remainder with tablet name that the user need medicine that are stored in database.

5.Project Design

5.1.Dataflow Diagrams



5.2.Technical Architecture



5.3.User Stories

USER TYPE	FUNCTIONAL REQUIREMENT (EPIC)	USER STORY NUMBER	USER STORY / TASK	ACCEPTANCE CRITERIA	PRIORITY	RELEASE
Customer (Mobile user)	Registration	USN - 1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN - 2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
	Login	USN - 3	As a user, I can login to the application through the email and phone number	I can register & access the dashboard with Email and phone number Login	High	Sprint-1
	Medical Report submission	USN - 4	As a user, Users should produce the Medical Report through the mobile application	Medical Reports are useful for some emergency cases or purpose.	Medium	Sprint-2
	Updating the Medical Report	USN - 5	As a user, Can updating their medical report details into the application	Updated medical reports are used to remind the updated pills or Medicine for the Reminder App.	Medium	Sprint-2

USER TYPE	FUNCTIONAL REQUIREMENT (EPIC)	USER STORY NUMBER	USER STORY / TASK	ACCEPTANCE CRITERIA	PRIORITY	RELEASE
	Schedules Pills Timing	USN - 6	As a user, I can schedules the pills or Medicine according to the doctor prescribed timings.	I can also modify my medicine schedule in future.	High	Sprit-2
	Sets Reminder	USN - 7	As a user, I can set the Pills Reminder through TTS Service	I can Set Reminder	High	Sprit-3
Administrator	Admin Login	ASN - 1	As a admin, I can Login with the ID and Password.	I Can Check the User Status.	High	Sprit-4
	Report Maintaining	ASN - 2	As a admin I Maintain the Report of the user.	Reports are send to the user's guardian.	Medium	Sprit-4
Guardian	Alert notification	GSN - 1	As a guardian, they receive alert message when user doesn't consume their medicine.	An alert message is send to the user and guardian when the user did not consume the concern pills.	Low	Sprit-3
	Report	GSN - 2	As a guardian, they get Weekly report and monthly report of the user from the admin	They can learn the health details of the User/patient with the help of the admin	Low	Sprit-3

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	Customer Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	3	High	Vanitha A
Sprint 2	Set Alarm	USN-3	As a user, I can set an alarm to alerting a medicine through medicine remainder system	10	High	Kavitha S

Sprint 2		USN-4	As a user, I can Activate and Deactivate the alarm	10	High	Kavitha S
Sprint 3	Notification	USN-5	As a user once I can the set the alarm then I gets the notification	10	High	Vijaya Diwaharan C
Sprint 3		USN-6	As a user, If I requires this system then a notification will be sent into his device.	10	High	Vijaya Diwaharan C
Sprint 4	Medication Detail	USN-7	As a user, I have multiple medications each day, Ican put each pill in the box for the corresponding day.	10	High	Nambi Nandhini S
Sprint 4		USN-8	As a user, between setting an alarm and using a pillbox, I'll be able to stay on top of your medications and not miss a dose.	5	low	Kavitha S
Sprint 4		USN-9	As a user, I can store the name of the medicine with its description	10	High	Kavitha S

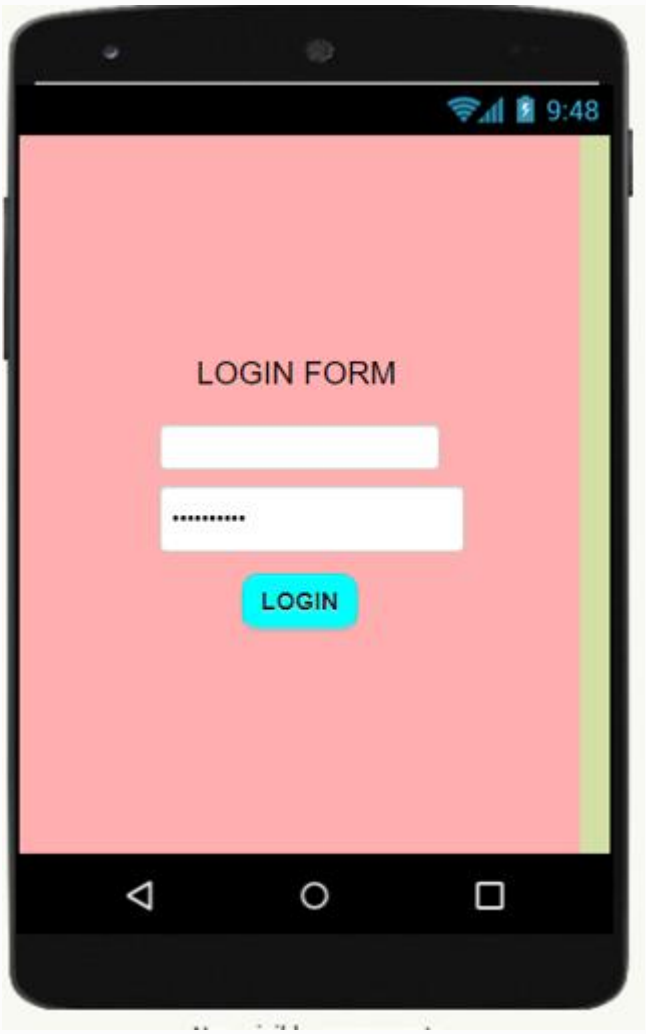
6.2.Sprint Delivery

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	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

7.Coding and Solutioning

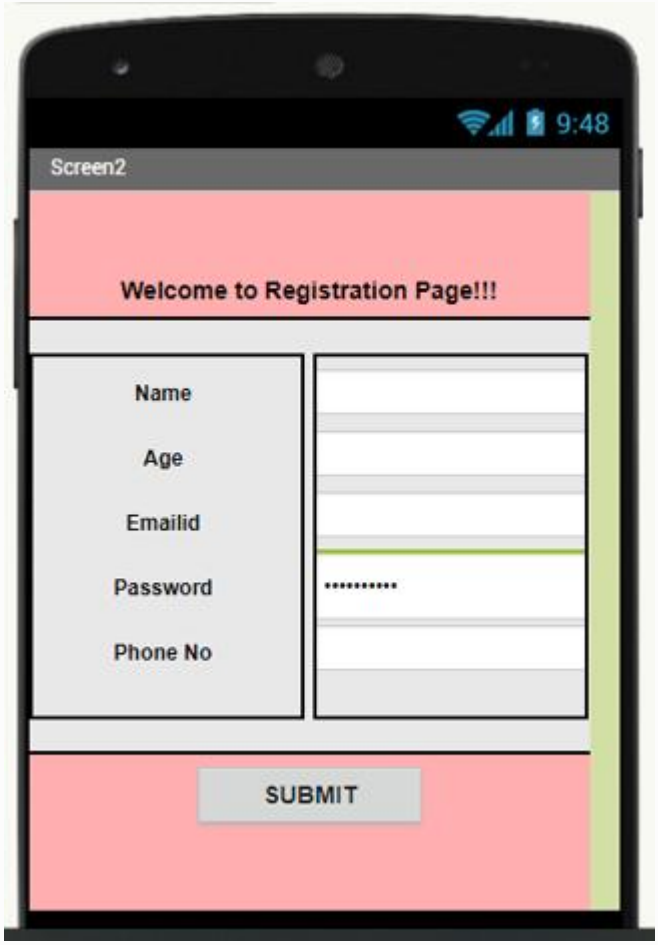
7.1.Feature 1

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



7.2.Feature 2

The mobile application also has the feature of registration ,stores the details in cloud



7.3.Feature 3

	id	key	value
☐	84b4bbdee0fa8a8ec0d57a9559cc1ea1	84b4bbdee0fa8a8ec0d57a9559cc1ea1	{"rev": "1-f04f18c31296f9461ab630f...
☐	ab4458aaab27cd4f0e4291c40dded9...	ab4458aaab27cd4f0e4291c40dded9...	{"rev": "2-7051cbe5c8faecd085a3fa...
☐	doc2	doc2	{"rev": "1-6c6b0c0372ea481095cf28...
☐	doc3	doc3	{"rev": "1-bcdc5ff9efca127a000f22d...

8.Testing

8.1.Test cases

Test case	Precondition	Test steps	Test data	Expected data
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:Kavitha Password:12345	User should be able to login successfully .

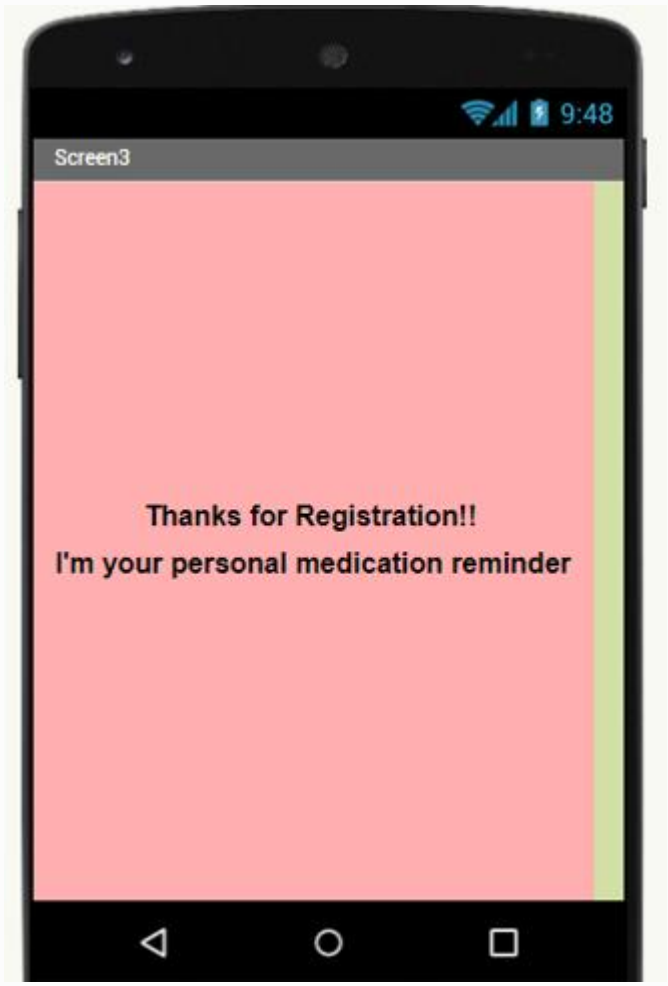
Verify login with invalid credentials	User should have a network connection	1.Launch URL 2.Enter valid username 3.Enter valid password 4.Click on the "Login" button	Username:Kavitha Password:123	User should not be able to login.
Update the medicine name with the time.	User should have a network connection	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

Users enters the invalid data

Registration page Testing



9.Results

9.1.Performance Metrics:

S. NO	Parameter	Performance
1.	Response Time	0.2s (Average of 10 trials)
2.	Workload	500 users (Calculated based on Cloud 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 and Disadvantages

Advantages

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

Disadvantages

- Makes people lethargic and makes them dependent always on others.
- Requres a stable internet conection.

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. 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 customized by the user and easy to use.

12.Future Scope

The project can be further developed by bringing into the feature of informing the medicine name during the notification.The voice assistance which is given can be customized by adding the user's voice or the caretaker's voice.Further the mobile application can update medicines by taking voice commands as an input from the user.

13. Appendix

Source Code:

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library 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  REPRESENT command type
AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth";// authentication method
char token[] = TOKEN;
```

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


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

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

void loop()// Recursive Function
{



 delay(1000);
 if (!client.loop()) {
  mqttconnect();
 }
}



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


void mqttconnect() {
 if (!client.connected()) {
  Serial.print("Reconnecting client to ");
  Serial.println(server);
  while (!!!client.connect(clientId, authMethod, token)) {
```

```
    Serial.print(".");
    delay(500);
   }

   initManagedDevice();
   Serial.println();
  }
}
void wificonnect() //function defination for wificonnect
{
 Serial.println();
 Serial.print("Connecting to ");

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

void initManagedDevice() {
 if (client.subscribe(subscribetopic)) {
  Serial.println((subscribetopic));
  Serial.println("subscribe to cmd OK");
 } else {
  Serial.println("subscribe to cmd FAILED");
 }
}

void callback(char* 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("data: "+ data3);
 if(data3=="announce")
 {
Serial.println(data3);
for(int i=0;i<5;i++){
DacAudio.FillBuffer();
 if(Sound.Playing==false)
  DacAudio.Play(&Sound);
 Serial.println(DemoCounter++);
}
 }

 else
 {
  pass;

 }
data3="";


}
```