ALAGAPPA CHETTIAR GOVERNMENT COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University, Chennai)

KARAIKUDI – 630003

Personal Assistant For Seniors Who Are Self-reliant

Using IoT

IBM PROJECT REPORT

Submitted by

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In partial fulfillment for the award of the degree

Of

BACHELOR OF ENGINEERING
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ALAGAPPA CHETTIAR GOVERNMENT COLLEGE OF ENGINEERING AND TECHNOLOGY

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BONAFIDE CERTIFICATE

Certified that this PROJECT REPORT **"Personal Assistant For Seniors Who Are Self-reliant Using IoT"** is the bonafide work of SHARMILA U **(91761915034)** SUVATHI M **(91762015042)**   SURTHI KALYAN K U **(91761915039)** DEVIKA R **(91761915010)** for **IBM NALAIYATHIRAN** in VII semester of B.E., degree course in Computer Science and Engineering branch during the academic year of 2022 - 2023.

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TABLE OF CONTENTS

LIST OF FIGURES

1.INTRODUCTION

Sometimes elderly people forget to take their medicine at the correct time. 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. To avoid this problem, this medicine reminder system is developed. An app is built for the user (caretaker) which enables him to set the desired time and medicine. These details will be stored in the IBM Cloudant DB. If the medicine time arrives the web application will send the medicine name to the IoT Device through the IBM IoT platform. The device will receive the medicine name and notify the user with voice commands.

1.1 Project Overview :
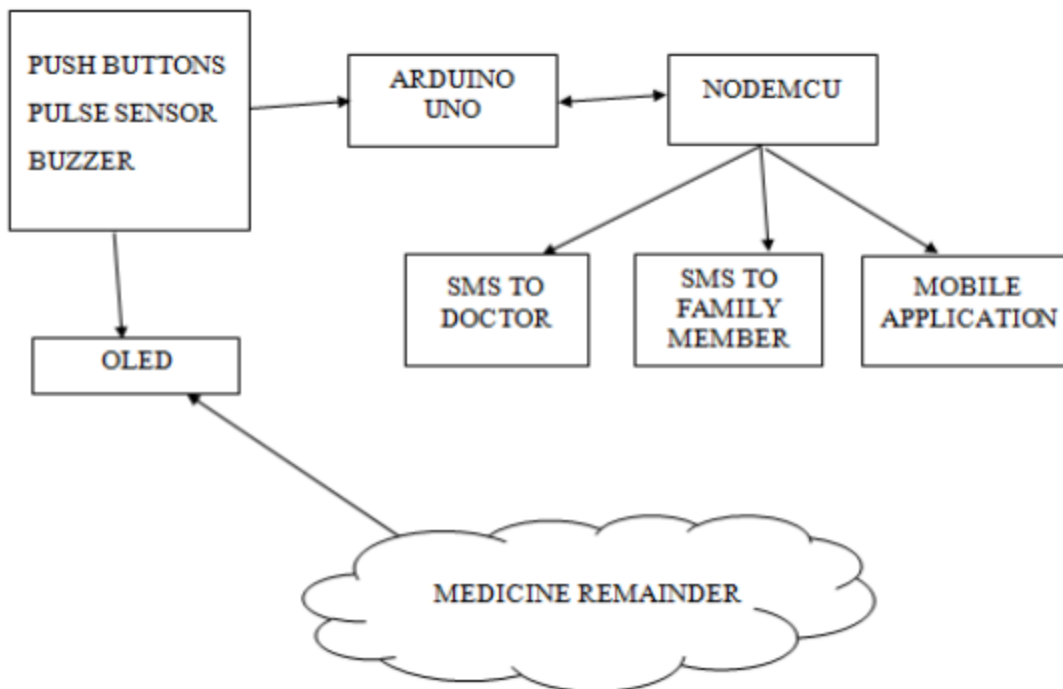
Sometimes patients forget to take the medicine at the required time of medicines. And sometimes patient also forgets which medicine He/She have to take at required time. And it is difficult for Doctor/Compounder to monitor patients around the clock. To avoid this problem, we have made this **medicine reminder system for patients using <u>Arduino</u>.** In this system we have used Arduino for controlling the whole system. Working of this project is very simple. In this system **ds1307 real time clock chip** is used for running the time accurate and to prevent the time after light failure by using **3 volt li-on battery** connected with this real time clock chip at pin number 3. **SDA** and **SCK** pin of real time clock chip is directly connected with **SDA** and **SCK** pin of Arduino (**A5** and **A4**) respectively.

1.2 Purpose:

- Sometimes elderly people forget to take their medicine at the correct time.
- An app is built for the user (caretaker) which enables him to set the desired time and medicine. These details will be stored in the IBM Cloudant DB.
- The device will receive the medicine name and notify the user with voice commands.
- In modern society, most of the time people remain busy in their daily life schedule. It is true that they give more preference to their work than taking care of their health.
- Several diseases like diabetes, blood pressure is nowadays very common. Maintaining daily medication become very difficult for old people.
- Sometimes younger is faced with the same problem. There are many people in our family who need constant help may it be our elderly people, younger or others. But it is not always possible for us to remind them of their medicine's dosages every time.
- For this purpose, there needs to be some facility for us which monitoring patient and take care. Nowadays we are all used to living technology-based life. We can use this technology in a way that will be beneficial for us.
- Cell phones aren't best utilized for calling but now maybe used as an ensemble of embedded sensors that together allow new packages including human services, healthcare, social networks, environmental tracking etc.

CHAPTER 2
LITERATURE SURVEY

2.1 Existing problem:

In modern society, most of the time people remain busy in their daily life schedule. It is true that they give more preference to their work than taking care of their health. Several diseases like diabetes, blood pressure is nowadays very common. Maintaining daily medication become very difficult for old people. Sometimes younger is faced with the same problem. There are many people in our family who need constant help may it be our elderly people, younger or others. But it is not always possible for us to remind them of their medicine's dosages every time. For this purpose, there needs to be some facility for us which monitoring patient and take care. Nowadays we are all used to living technology-based life. We can use this technology in a way that will be beneficial for us.

Cell phones aren't best utilized for calling but now maybe used as an ensemble of embedded sensors that together allow new packages including human services, healthcare, social networks, environmental tracking etc. Today in medical services frameworks, the usage of cell phones is turning into an expanding number of values [1]. IoT may be helpful to monitor real-time condition and IoT can be a powerful and effective paradigm to store data collected by sensors devices to the cloud. In our project, the IoT enabled device will control the overall monitoring system. And developed an android application which help patients by reminding medicine in take time and so on

2.2 References:

PAPER NAME	YEAR	AUTHOR	METHODOLOGY	MERIT	DEMERIT
E-health system for monitoring elderly health based on Internet of Things and Fog Computing	2019	• Hafedh Ben Hassen • Wael Dghais • Belgacem Hamdi	This model proposes an e-health system for monitoring elderly health based on the Internet of Things (IoT) and Fog computing.	Physiological parameters and general parameter are gathered using Mysignals HW V2 platform and Android app.	The system might be complex.
Internet-of-Things and smart homes for elderly Healthcare: An End User Perspective	2018	• Debajyoti pai • Suree funilkul • Nipon charoenkitkarn • Prasert kanthamanon	This model is exclusively associated with the elderly people and includes features that are unique to such a population. This model is based upon UTAUT framework.	Actual adoption of smart home services for healthcare by the elderly people.	Issue of data privacy and overall trust. geographical distribution of the elderly subjects.

An Elderly Care System Based on Multiple Information Fusion	2018	• Zhiwei He • Dongwei Lu • Yuxiang Yang • Mingyu Gao	The system consists of a main board and several information acquisitions boards. The main control board is the core of the hardware system, while the information acquisition boards are the basis. The Information acquisition boards are installed around the room at the right places. The voice, infrared, and pulse data are then collected directly by these information acquisition boards and some of the living status of the elderly, such as whether he/she is absent or is sleep abnormally, can then be obtained easily.	It solves the problem of high risk of daily life of elderly people who are in "empty nest" state. It uses multi-information fusion technology.	It gives limited information about the living status of the elderly.
Personal Assistance Device For Independent Senior Citizens/Patients	2020	• A.Yuvaraj • B.N.Gunasekhar Reddy • C.V.Saritha	This model offers an affordable personal assistance device for health monitoring of elderly people using different sensors which can measure pulse rate, position of elderly.	Help seniors to maintain their quality of life at home and to lighten the load of full time or family caretaker.	Problems for persons with cognitive impairments

2.3 Problem Statement Definition:

- Elderly people specially face the problem do not take their medicines in the correct quantity at the correct time because of their degrading memory and in severe cases, forget that they have already taken their prescription and retake the same medicine 2 or 3 times in the same duration.

- Our smart medicine reminder system is designed for helping old people in taking care of themselves in taking their medications at the correct time and in the correct amount.

- The medicine reminder system will have one duty and that would be to remind the user that he is due for taking the medicine. we have also added a buzzer which will give a auditory indication that the medicine needs to be taken.We have a mobile reminder app which will remind using mobile notifications for that time.

- The mobile application can be installed in the android devices. It will add recurring events to the mobile's calendar and will alert the user when he has to take the medicine with the list of medicines and it's prescribed dosage.

- Some of the main features of our system are, Storing the doctor's prescription,Adding Reminders for taking medicine and Showing the list of medicines with their dosage at prescribed time .

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas:

An empathy map is a template that organizes a user's behaviors and feelings to create a sense of empathy between the user and your team.The empathy map represents a principal user and helps teams better understand their motivations, concerns, and user experience.

Empathy mapping is a simple yet effective workshop that can be conducted with a variety of different users in mind, anywhere from stakeholders, individual use cases, or entire teams of people.
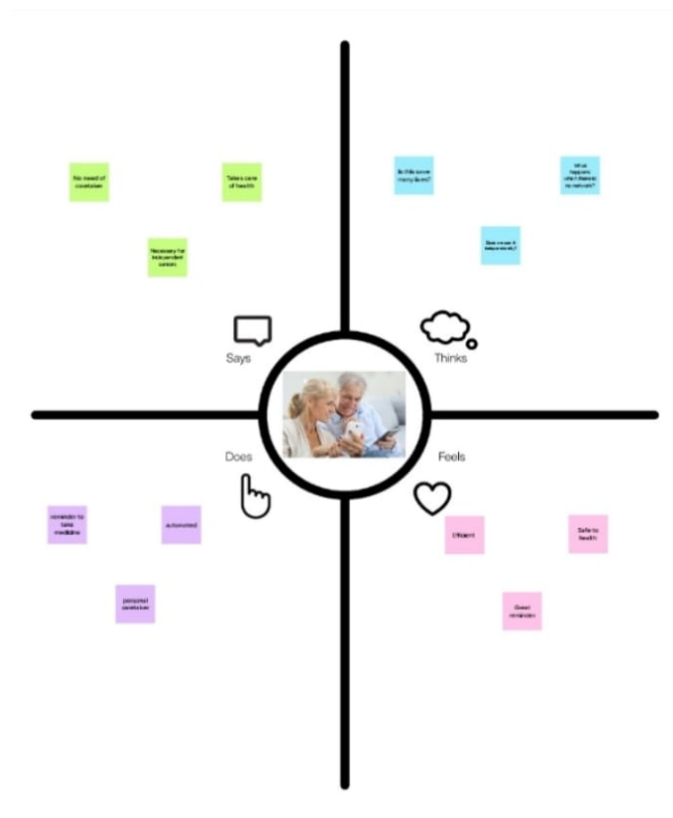
Fig 3.1.1 Empathy Map Canvas

3.2 Ideation & Brainstorming:

Brainstorming is a method of generating ideas and sharing knowledge to solve a particular commercial or technical problem, in which participants are encouraged to think without interruption. Brainstorming is a group activity where each participant shares their ideas as soon as they come to mind. At the conclusion of the session, ideas are categorised and ranked for follow-on action.

Fig 3.2.1 Brainstorm

Fig 3.2.2 Group ideas

Fig 3.2.3 Prioritize

3.3 Proposed Solution:

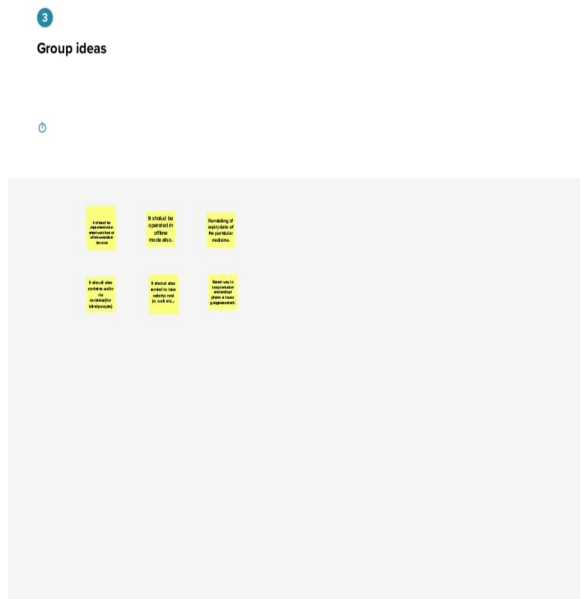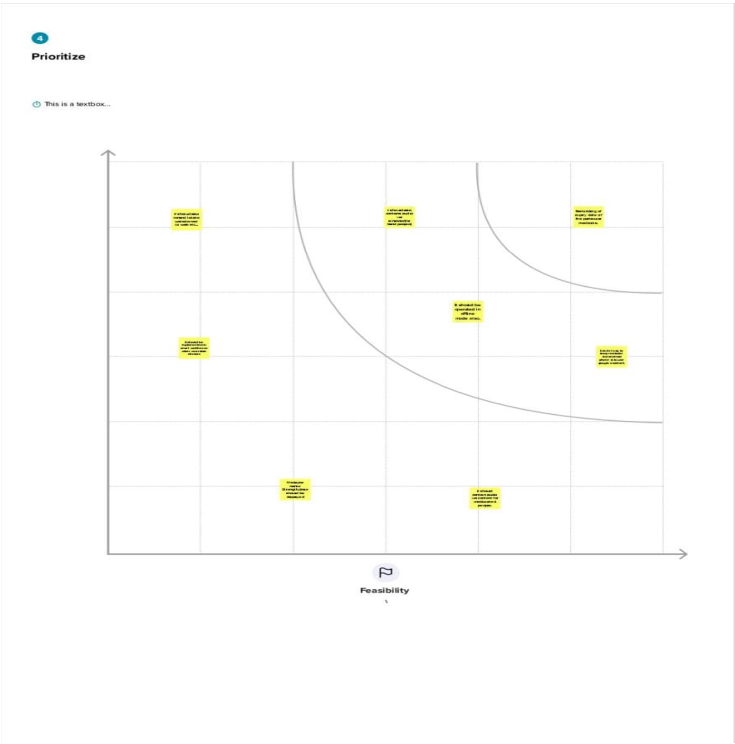| S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Sometimes elderly people forget to take their medicine at the correct time. They also forget which medicine He / She should take at that particular time.
2.	Idea / Solution description	An app is built for the user (caretaker) which enables him to set the desired time and medicine. These details will be stored in the IBM Cloudant DB.
3.	Novelty / Uniqueness	The device will receive the medicine name and notify the user with voice commands.
4.	Social Impact / Customer Satisfaction	By giving appropriate medcines at a right time it reduces the mortaility rate and avoid emergency situations. Patients can take appropriate medicine at a correct time. This prevents from taking wrong medicine with a help of voice command.
5.	Business Model (Revenue Model)	This app reduces the delay of medicine given to the elderly people which will be given by the user(caretakers).
6.	Scalability of the Solution	This solution works the user (caretaker).

3.4 Problem Solution fit:
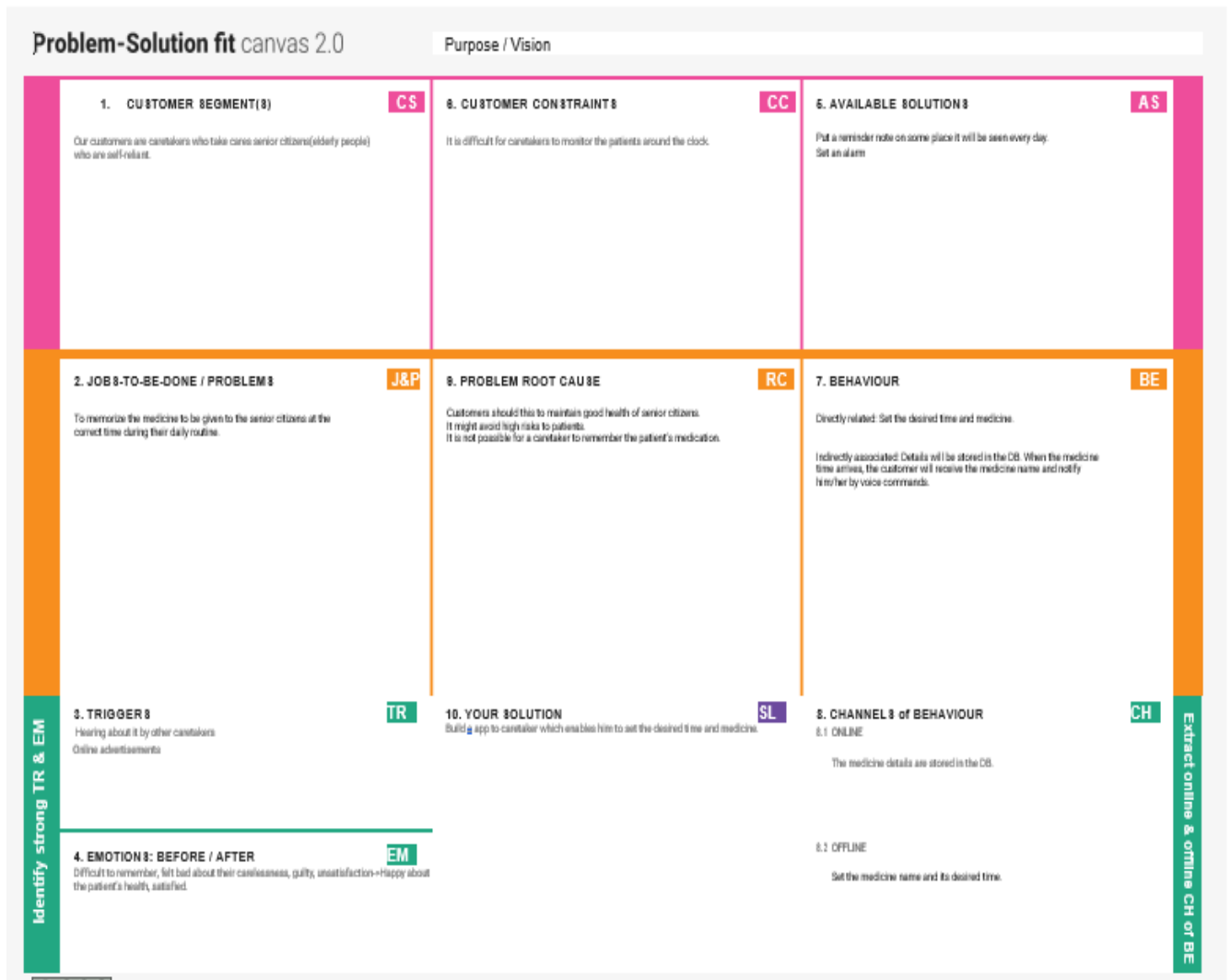
Fig 3.4.1 Problem Solution fit

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 Functional requirement:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Input	First the elderly people and the caretakers give their details to login to the application.
FR-2	Prediction Model	An app is built for the user(caretaker) which enables him/her to set the time ,medicine and dose.These details will be stored in the IBM cloud and DB.
FR-3	User Output	The application reminds the user at correct time with help of a alarm sound.
FR-4		

1. Tinkercat

2. Python IDLE

3. IBM Watson IoT Platform

4. Node-RED Service

5. Cloudant DB

6. MIT

4.2 Non-Functional requirements:

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	All the people can use this model because we are including recognition in this application.
NFR-2	**Security**	
NFR-3	**Reliability**	It reminds the caretaker about the correct medicine at the correct time.
NFR-4	**Performance**	This app reduces the delay of medicine given to the elderly people which will be given by the user(caretakers).
NFR-5	**Availability**	The Web Application is available in both online and offline mode.
NFR-6	**Scalability**	This solution works for the user(caretaker).

1. LCD 16x2

2. 220Q Resistor

3. Piezo

4. Arduino Uno R3

5. LED(Green,Red,Blue)

6. Positional Micro Servo

7. 1 k ome Resistor

CHAPTER 5
PROJECT DESIGN

5.1 Data Flow Diagrams:

A data-flow diagram is a way of representing a flow of data through a process or a system (usually an information system). The DFD also provides information about the outputs and inputs of each entity and the process itself. A data-flow diagram has no control flow there are no decision rules and no loops. Specific operations based on the data can be represented by a flowchart.
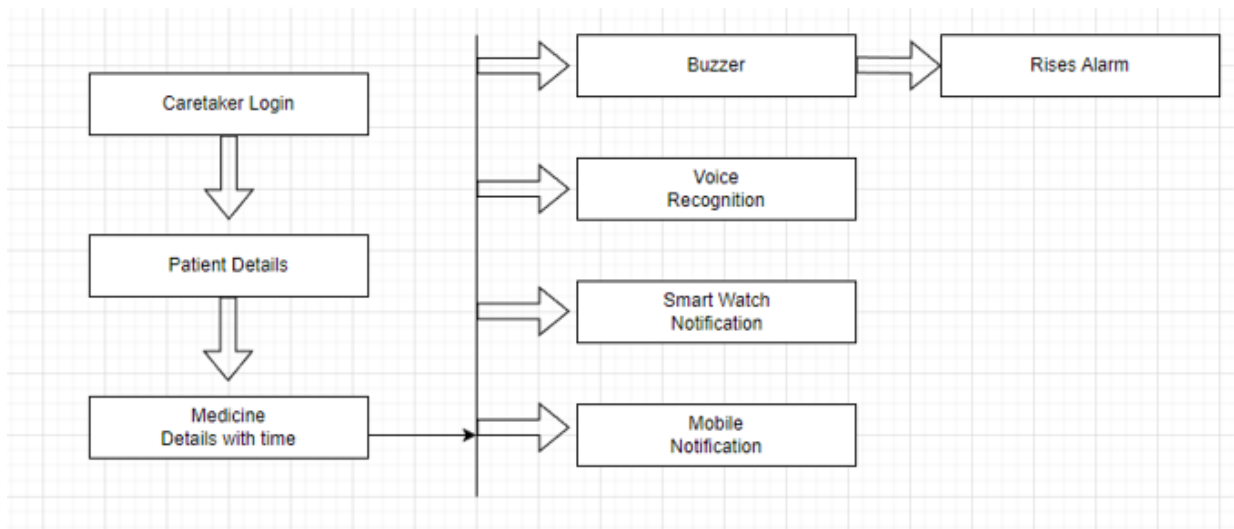

Fig 5.1.1 Data Flow Diagram

5.2 Solution & Technical Architecture:

Technical Architecture (TA) is a form of IT architecture that is used to design computer systems. It involves the development of a technical blueprint with regard to the arrangement, interaction, and interdependence of all elements so that system-relevant requirements are met.
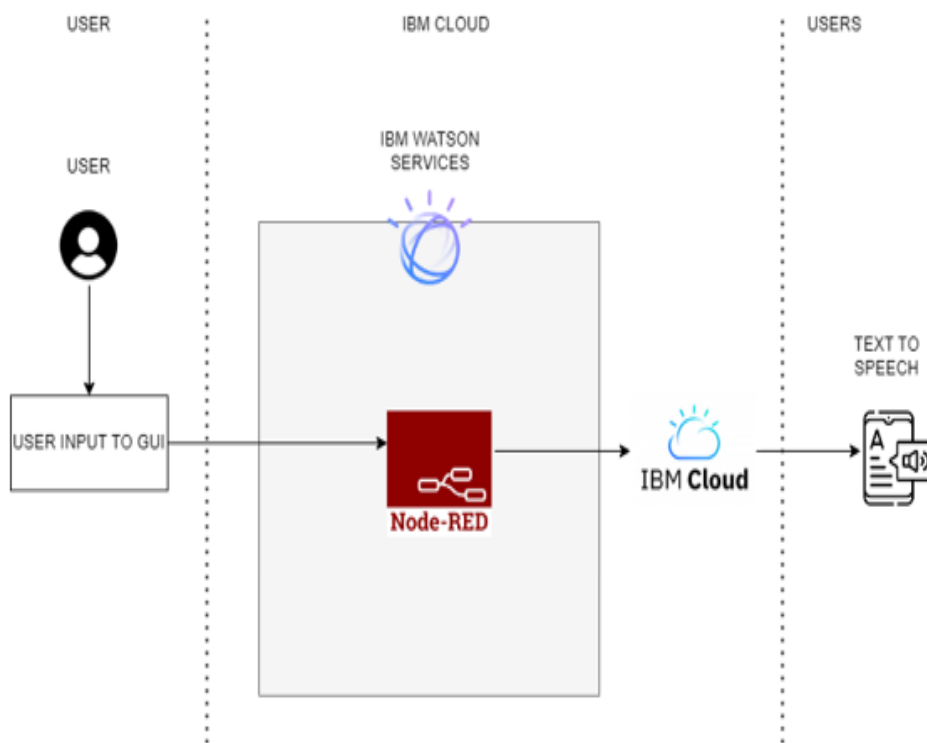
Fig 5.2.1 Technical Architecture

Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Mobile App	HTML, CSS, JavaScript
2.	Application Logic-1	Receive data from node-red by using IBM Watson IoT platform	Python
3.	Application Logic-2	Get the time and compare it with the time stored in the database. Send the medicine time to IBM IoT platform at the desired time	NODE-red
4.	Application Logic-3	Reminder	IBM Watson Device
5.	Cloud Database	Desired time and medicine details will be stored in the IBM Cloudant DB	IBM Cloudant
6.	External API-1	It notifies the care taker with the medicine name.	Text to Speech API
7.	Infrastructure (Server / Cloud)	It stores the medicine and time details	Cloud Foundry

Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	open-source frameworks used in IBM Watson	Technology of Opensource framework IBM Watson
2.	Security Implementations	IBM Cloud	Watson Assistant has certifications such as ISO,SOC2,US HIPPA,European Union GDPR,PCI DSS. We use security systems such as TCS/SSL,IPSEC,Third party CAs,HTTPS,Encrypted file system,Encrypted storage systems,key management systems,AES -256 bit
3.	Scalable Architecture	Web interface architecture consist of four pillars. They are intents, entities ,data flow, scripts (3 – tier architecture Micro-services architecture)	Technology used IBM Watson Assistant
4.	Availability	The Web interface is made available using load balancers, distributed servers etc.	Technology used BM Watson Assistant
5.	Performance	IBM Watson –automate processes	Technology used BM Watson

5.3 User Stories:

Use the below template to list all the user stories for the product.

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
		USN-3	As a user, I can enter patient details.	I can register & access the patient details.	High	Sprint-1
		USN-4	As a user, I can give the medicine details with correct dosage and time.	I can ensure the medicine details are stored in cloud.	High	Sprint-1
		USN-5	As a user, I will be notified by alarm and medicine name.	I can receive the alarm.	High	Sprint-1
Customer Care Executive	Creating awareness		As a customer care executive, I can advertise the product to people.	I can ensure the benefit of caretakers.	High	Sprint-1
Administrator			As a administrator I will create a cloud storage to store the medicine details	I can remind the medicine name at the correct time	High	Sprint-1

CHAPTER 6

PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation:

Title	Description	Date
Literature survey and Information gathering	Literature survey on the selected project& gathering information by referring thetechnical papers, research publications etc	1 October 2022
Prepare Empathy Map	Prepare empathy map canvas to capture the user pains and gains. Prepare list of problem statement	22 September 2022
Ideation	List the by organizing the brainstorming session and prioritize the top threeideas based on the feasibility and importance.	15 October 2022
Proposed solution	Prepare the proposed solution document which includes the novelty,	13 October 2022

	feasibility of idea, business model, social impact, scalability of solution etc.	
Problem solution fit	Prepare problem solution fit document	01 October 2022
Solution Architecture	Prepare solution architecture document	10 October 2022
Customer journey	Prepare the customer journey maps to understandthe user interactions and experiences with theapplication	22 October 2022
Functional requirements	Prepare the functional requirements document	16 October 2022
Data flow diagrams	Draw the data flow diagrams and submit for review	19 October 2022
Technology Architecture	Prepare the technology architecture diagram.	7 November 2022
Prepare Milestone and Activity List	Prepare the milestone and activity list of the project.	15 November 2022
Sprint Delivery plan	Prepare the sprint delivery plan.	15 November 2022
Project Development- Delivery of sprint-1,2,3&4	Develop and submit the developed code by testingit.	IN PROGRESS

6.2 Sprint Delivery Schedule:

Product Backlog, Sprint Schedule, and Estimation

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	IBM Watson IOT platform	USN-1	Creating devices and board and generating data	1	medium	Sharmila U Suvathi M Surthi Kalyan K U Devika R
Sprint-2	Storing Data using node-red	USN-2	Storing the data in IBM Cloudant DB through node-red functions	2	High	Sharmila U Suvathi M Surthi Kalyan K U Devika R
Sprint-3	IoT device/ Microcontroller Board	USN-4	The board connect with the cloud and retrieve the information and remain the peoples	2	Low	Sharmila U Suvathi M Surthi Kalyan K U Devika R
Sprint-4	Reminder (TTS)	USN-5	Getting the speech reminder to users to take their tablet	1	High	Sharmila U Suvathi M Surthi Kalyan K U Devika R

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	IBM Watson IOT platform	USN-1	Creating devices and board and generating data	1	medium	Sharmila U Suvathi M Surthi Kalyan K U Devika R
Sprint-4	Reminder (TTS)	USN-5	Getting the speech reminder to users to take their tablet	1	High	Sharmila U Suvathi M Surthi Kalyan K U Devika R

Project Tracker, Velocity & Burndown Chart:

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	5 Days	30 Oct 2022	03 Nov 2022	20	03 Nov 2022
Sprint-2	20	5 Days	04 Nov 2022	08 Nov 2022	20	08 Nov 2022

| Sprint-3 | 20 | 5 Days | 09 Nov 2022 | 13 Nov 2022 | 20 | 13 Nov 2022 |
| Sprint-4 | 20 | 6 Days | 14 Nov 2022 | 19 Nov 2022 | 20 | 19 Nov 2022 |

Velocity:

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$
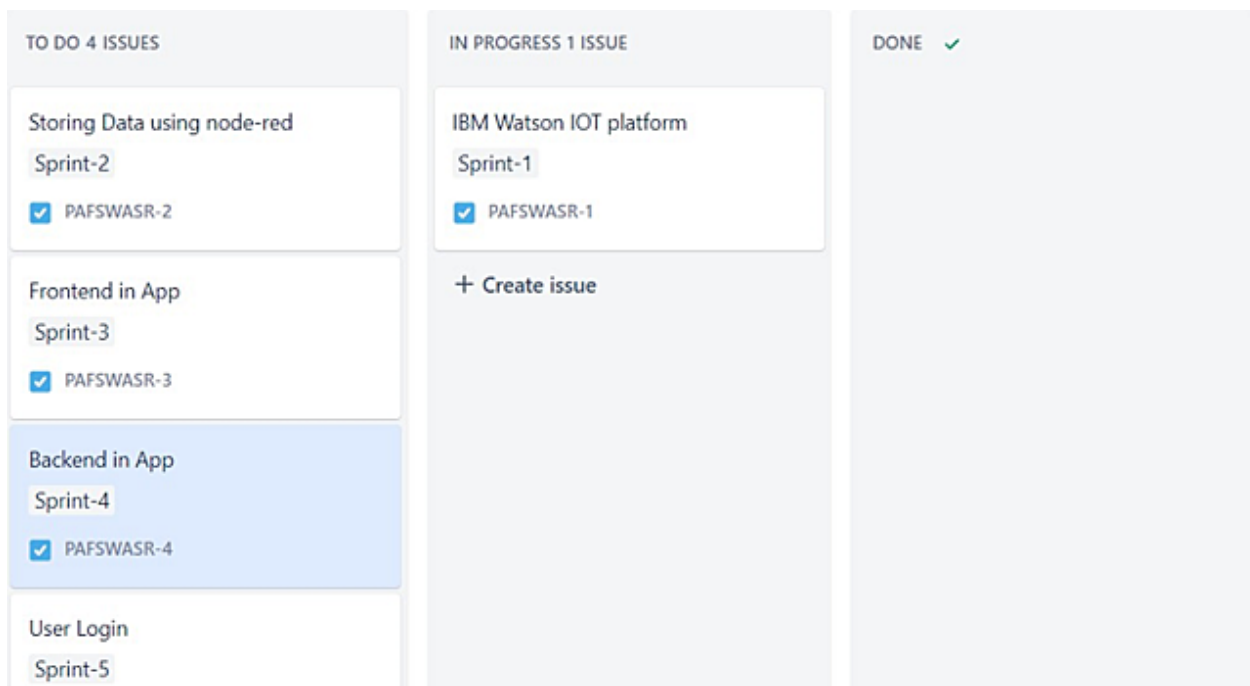
Burndown Chart:

Fig 6.3.1 table sprint planning and estimation

CHAPTER 7

CODING & SOLUTIONING

7.1 Feature 1

In the feasibility study, not all of reminders were effective for patients to take their medication in case they were away from the smartphone or they did not notice the small sound of reminders. We would design and improve reminders to repeat second or third time in user's favorite interval, to display some messages about reminders on the smartphone until the patient inputs records of medication-taking, or to send a reminder to their home phone.If someone else is taking an active part in helping to manage user's medications, then they prefer an app with a number of collaboration features. MyTherapy measures and stores vitals, keeps medication usage history with the ability to print personal health report and share results with a doctor or family members.Care Zone uses the camera to take pictures of important documents and save them. The app helps to organize key contacts including doctors, pharmacies, insurance, and family members to safely share access to coordinate care.

7.2 Feature 2

One of the wonders of modern medicine are the wide variety of medications that enhance both the quality and length of our lives. Today medicine is used to control blood pressure, insulin, cholesterol and even the rate at which our hearts beat. Yet medicines are both a godsend and a curse. If prescribed and managed properly they work. If not, then they are not effective and can even result in hospitalization or death. This is why having a medication reminder system that works is very important to your health. It is also important to "brown bag" your medications from time to time as part of good medication management practices. Medication reminder systems must include more than a nudge to take the medication at the right time. They must also include knowledge of how you need to

take the medication. Does it need to be taken with food or on an empty stomach? Do you need to avoid certain foods or drinks while taking it? For instance, many medications require that you avoid drinking grapefruit juice. Other medication may require you to abstain from drinking alcohol. Some work better if you take them before you go to bed, and so on. Your medication reminder system must include this information. If you are taking fewer than six medications daily, you may be able to commit information on how to take your medication to memory, such as remembering to take Metformin with every meal. However, no matter how many medications you take nearly everyone can benefit from a medication reminder system.

CHAPTER 8

TESTING

Testing is the process of executing a program to find errors. To make our software perform well it should be error-free. If testing is done successfully it will remove all the errors from the software.

Principles of Testing:

- All the tests should meet the customer requirements.
- To make our software testing should be performed by a third party.
- Exhaustive testing is not possible. As we need the optimal amountof testing based on the risk assessment of the application.
- All the tests to be conducted should be planned before implementing it.
- It follows the Pareto rule(80/20 rule) which states that 80% of errors come from 20% of program components.
- Start testing with small parts and extend it to large parts.

8.1 TEST CASES :

The test case is defined as a group of conditions under which a tester determines whether a software application is working as per the customer's requirements or not. Test case designing includes preconditions, case name, input conditions, and expected result. A test case is a first level action and derived from test scenarios.

It is an in-details document that contains all possible inputs (positive as well as negative) and the navigation steps, which are used for the test execution process. Writing of test cases is a one-time attempt that can be used in the future at the time of regression testing.

Test case gives detailed information about testing strategy, testing process, preconditions, and expected output. These are executed during the testing process to check whether the software application is performing the task for that it was developed or not.

Test case helps the tester in defect reporting by linking defect with test case ID. Detailed test case documentation works as a full proof guard for the testing team because if developer missed something, then it can be caught during execution of these full-proof test cases.

To write the test case, we must have the requirements to derive the inputs, and the test scenarios must be written so that we do not miss out on any features for testing. Then we should have the test case template to maintain the uniformity, or every test engineer follows the same approach to prepare the test document.

Feature Type	Component	Test Scenario	Steps To Execute
Installation IBM IOT Platform	PC/Software	Installation of IBM IoT and Dashboard nodes for Node-Red and IBM Watson IoT Platform.	1.Open Node-red using IBM cloud 2.Installing package to connect with IBM watson and configure the node with the Authentication Key and ID using IBM watson iot platform.3 Arrange the functional nodes for the parameters and configure them 4.connect all nodes with msgpayload and deploy them. STEP 2 :Create an account in IBM cloud using your email ID 1.Create IBM Watson Platform in services in your IBM cloud account 2. Launch the IBM Watson IoT Platform 3.Create a new device 4.Give credentials like device type, device ID, Auth. Token 5.Create API key and store API key and token elsewhere

IBM Watson and Python Integration	IBM CLOUD platform /Python 3.62 application.	To Generate Medicine names	1.Install Python 3.6.2 2.Install the package wiotp.sdk. 3.Import the package in python 4.provide the device credentials from IBM iot watson platform . .5.Run the program
Node-Red	IBM IOT/ MIT/ WEB PAGE	To establish connection to IBM iot watson platform and then configuring Node Red for the parameters	1.Open Node-red using IBM cloud . 2.Installing package to connect with IBM watson and configure the node with the API and ID using IBM watson iot platform. 3. Arrange the functional nodes for the parameters and configure them. 4.Connect all nodes with msgpayload and deploy them.
Mit app(Front end and Back end)	Reminder page Screen 1	Receive medicine details from node-red and display them.	1.Use the components given in the app to build the reminder page 2.Components like text box,Buttons,horizontal arrangements and variations allignments to be made. 3.Download and import extension for alarm setting. 4.Click on Submit button. 5.Reminder was set.
Mobile application	Final Screen	To set reminder for the medicine at a particular time.	1.Receiving medicine details 2.Setting alarm by clicking on the set reminder buttom

8.2 User Acceptance Testing:

User Acceptance Testing (UAT) is a type of testing performed by the end user or the client to verify/accept the software system before moving the software application to the production environment. UAT is done in the final phase of testing after functional, integration and system testing is done.

1. Purpose of Document:

- An app is built for the user (caretaker) which enables him to set the desired time and medicine. These details will be stored in the IBM Cloudant DB.

- If the medicine time arrives the web application will send the medicine name to the IoT Device through the IBM IoT platform.

- The device will receive the medicine name and notify the user with voice commands.

2.Defect Analysis:

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

Resolution	Total Cases	Not Tested	Fail	Pass
Install python	10	0	5	5
Launch IBM Watson	15	0	7	8
IBM Watson and python integration	20	0	8	12

Install Node red	2	0	0	2
Interconnecting IBM Watson and node red	30	0	10	20
Web UI dashboard	10	0	4	6
MIT app design	50	10	12	28
To view the values in mobile application	15	0	7	8

8.3 Performance Testing:

Performance Testing is a software testing process used for testing the speed, response time, stability, reliability, scalability, and resource usage of a software application under a particular workload. The main purpose of performance testing is to identify and eliminate the performance bottlenecks in the software application.

- Gatling
- Lucast
- Jira

8.3.1.Gatling:

Gatling is a load testing tool which can be used for your integrated development environment, version control systems and continuous integration solutions. It does not have its own solution, rather it integrates with your existing solutions.

Gatling

Documentation

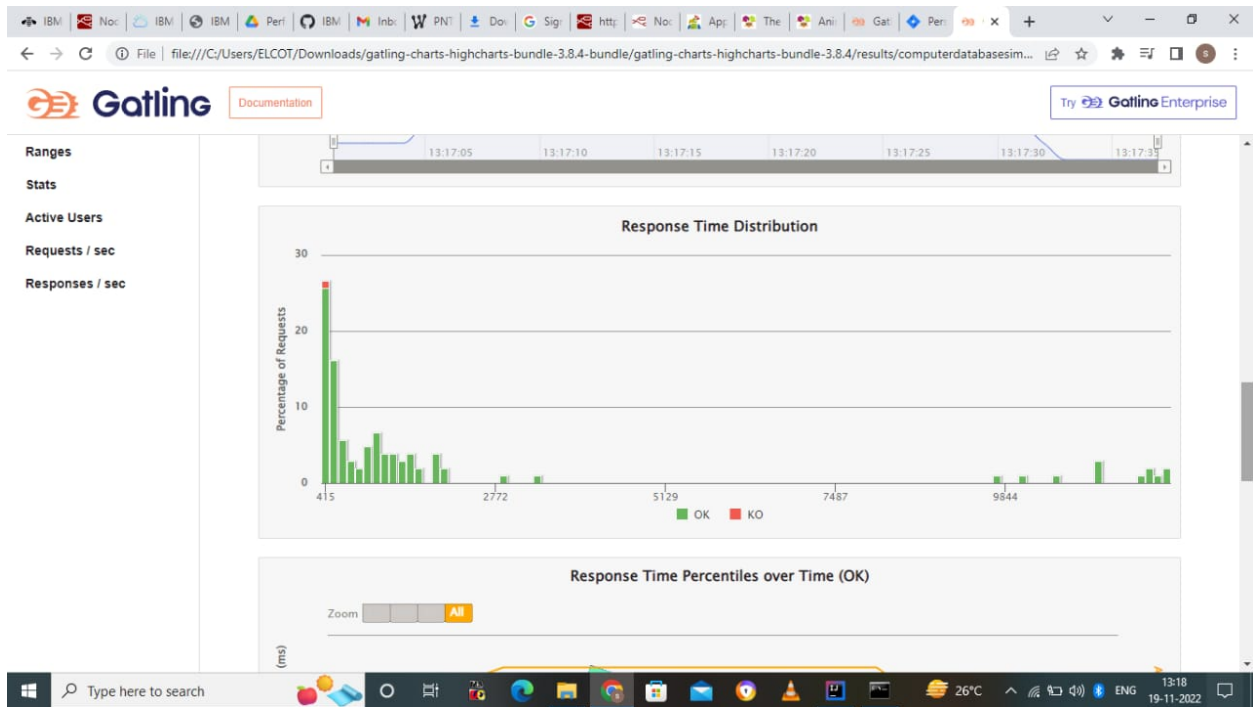Try Gatling Enterprise

Ranges
Stats
Active Users
Requests / sec
Responses / sec

Error ▼	Count ▼	Percentage ▼
status.find.is(201), but actually found 200	1	100 %

Active Users along the Simulation

— Admins
— Users
— Active Users

Zoom [ ][ ][ ] All

Response Time Distribution

Gatling

Documentation

Try Gatling Enterprise

Ranges
Stats
Active Users
Requests / sec
Responses / sec

Expand all groups   Collapse all groups

Requests ▲	Executions					Response Time (ms)							
	Total ⬍	OK ⬍	KO ⬍	% KO ⬍	Cnt/s ⬍	Min ⬍	50th pct ⬍	75th pct ⬍	95th pct ⬍	99th pct ⬍	Max ⬍	Mean ⬍	Std Dev ⬍
All Requests	105	104	1	1%	2.838	356	770	1527	11614	12118	12142	2091	3364
Home	12	12	0	0%	0.324	1444	1929	2029	3147	3364	3418	2014	565
Home Redirect 1	12	12	0	0%	0.324	364	439	556	5784	10535	11723	1425	3108
Search	12	12	0	0%	0.324	369	541	779	1715	1934	1989	754	486
Select	12	12	0	0%	0.324	356	678	1167	10584	11040	11154	2352	3727
Page 0	12	12	0	0%	0.324	390	861	1349	11973	12093	12123	2655	4189
Page 1	12	12	0	0%	0.324	382	805	1231	11278	11969	12142	2518	3979
Page 2	12	12	0	0%	0.324	448	1080	1275	11145	11173	11180	2669	3802
Page 3	12	12	0	0%	0.324	402	630	1334	11936	11991	12005	2640	4178
Form	3	3	0	0%	0.081	367	601	5153	8795	9523	9705	3558	4348
Post	3	3	0	0%	0.081	672	727	1021	1255	1302	1314	904	291
Post Redirect 1	3	2	1	33%	0.081	375	407	747	1018	1072	1086	623	328

Errors

| Error ⬍	Count ⬍	Percentage ⬍
status.find.is(201), but actually found 200	1	100 %

8.3.2 Locust:

CHAPTER 9

RESULT

9.1 Performance Metrics:

Performance metrics are data used to track processes within a business. This is achieved using activities, employee behavior, and productivity as key metrics. These metrics are then used by employers to evaluate performance. This is in relation to an established goal such as employee productivity or sales objectives

{"time":"21-40","date":"2022-11-18","name":"Digene"}
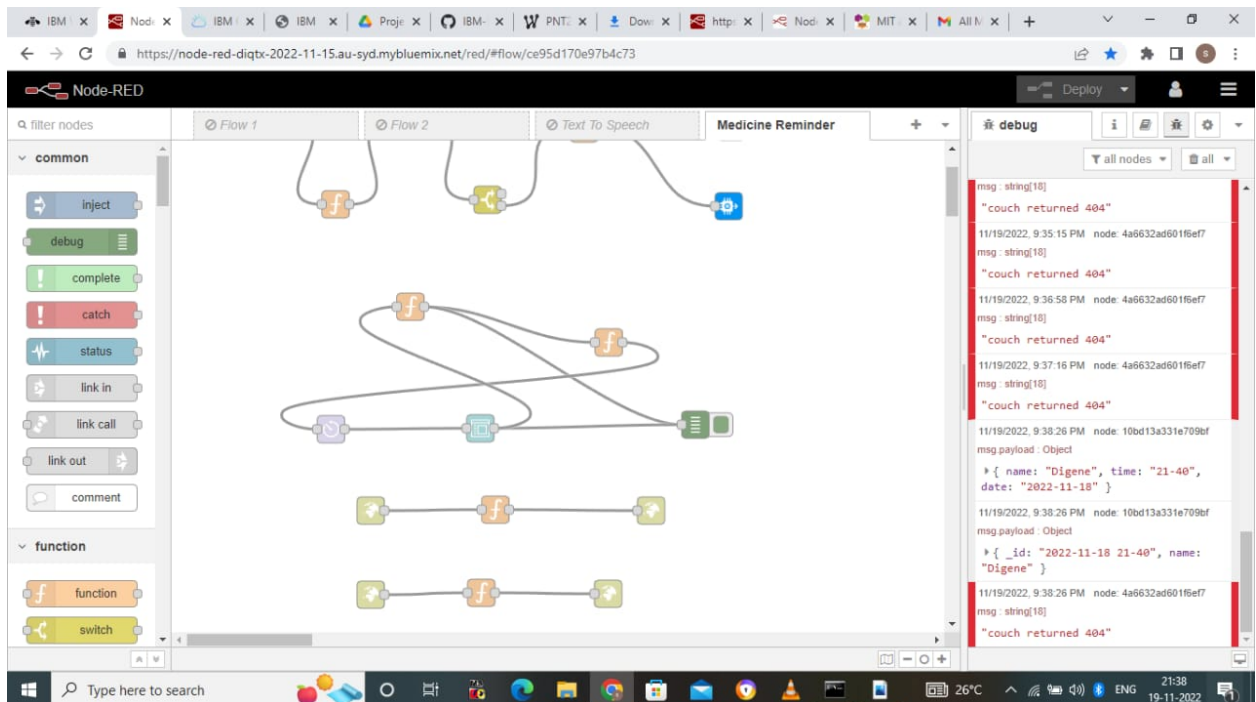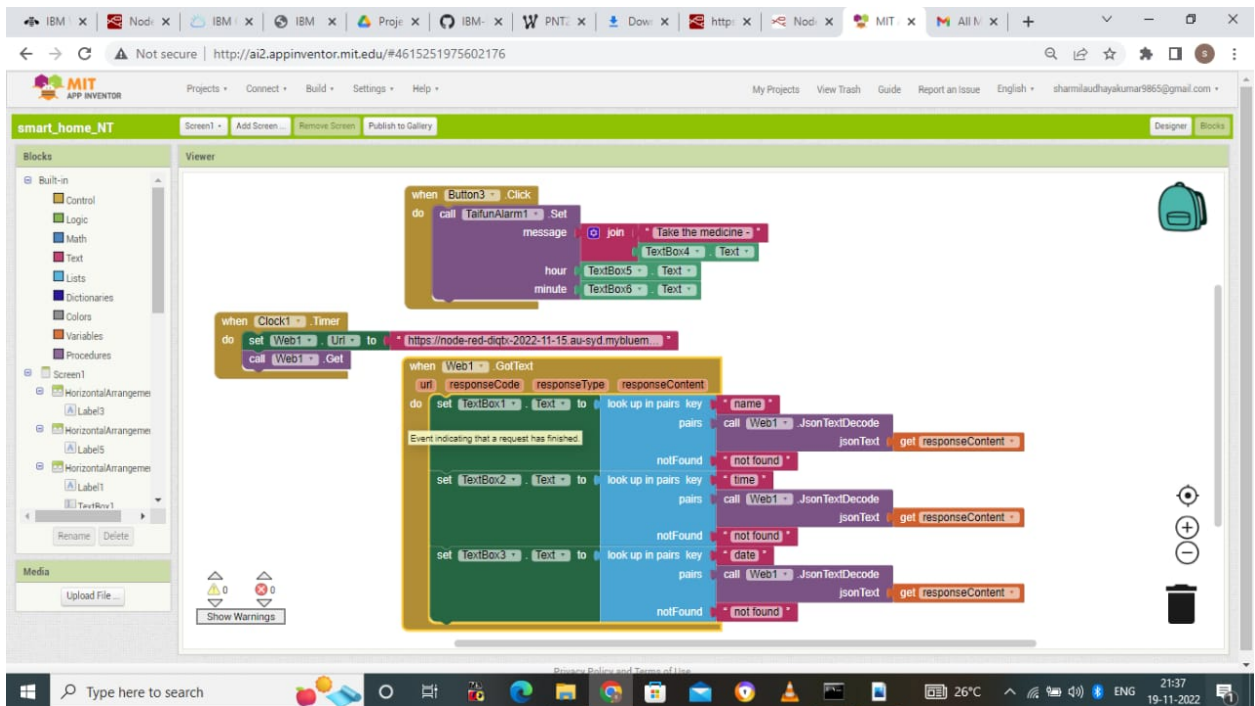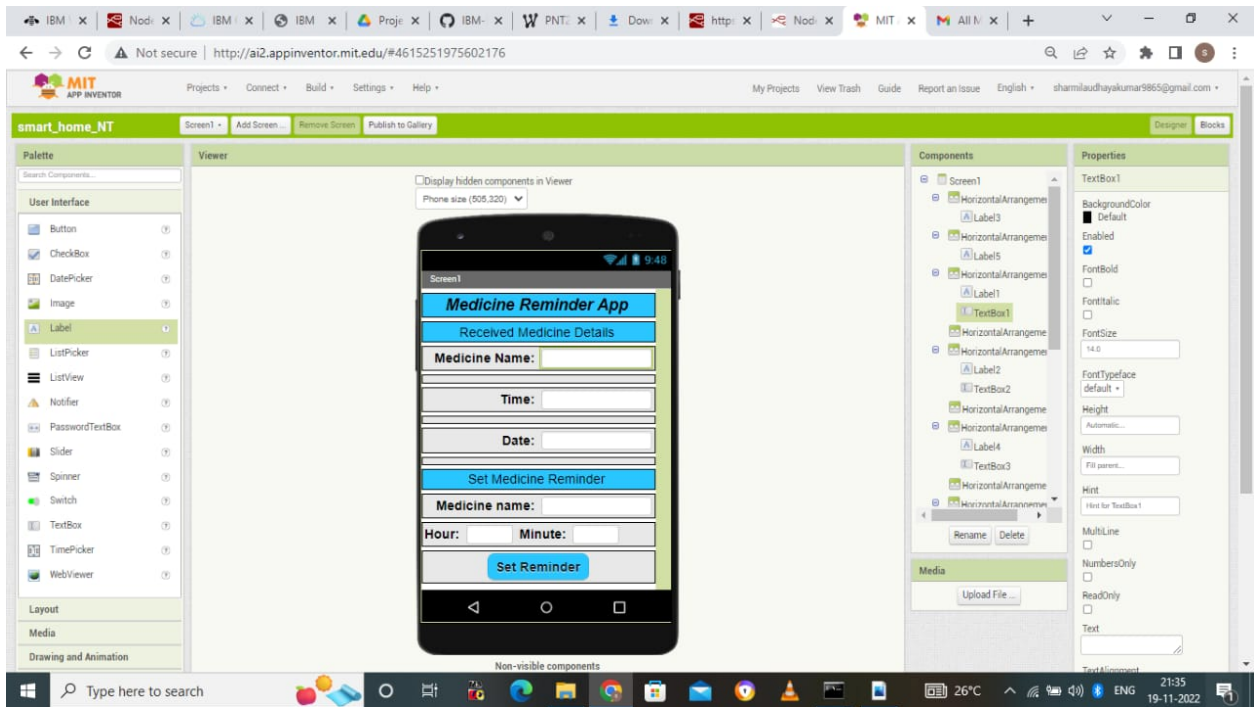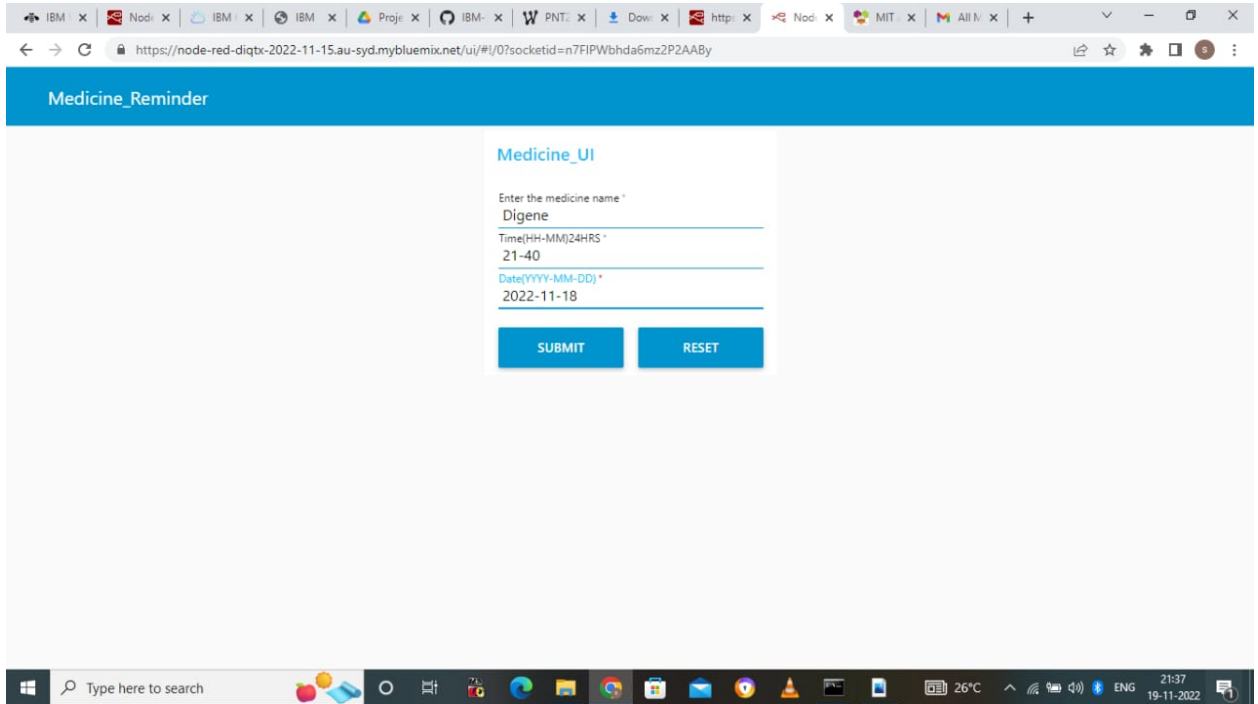
CHAPTER 10

ADVANTAGES & DISADVANTAGES

ADVANTAGES

- medication reminder and organizer can help to prevent these life-threatening mistakes. They remind your loved one to take the right medication at the right time. Medication reminders are an important piece of any aging in place plan
- Reminds Your Senior to Take Their Medication
- Prevent Errors

It is easy for seniors to take the wrong meds or even skip doses. Medication reminders prevent this from happening. There is nothing your senior has to read or figure out. They simply need to take the pills in the compartment after the reminder beeps.

- Easy to Use

- Be Proactive

By giving your loved one a medication reminder, you are also giving them greater health and independence. Help them age in place with the right tools to help them stay safe a healthy

- Personalized Care
- Faster Recovery
- One-on-one Attention
- Cost Effectiveness
- Peace of mind
- Independence
- Companionship.

DISADVANTAGES:

- There is always a safety concern for seniors

- It becomes difficult to maintain your property

- Aging brings about an increase in loneliness

- It is more difficult to get around as you get older

- Cost Efficient

- Power supply problems

- Circuit Cost High

- Maintenance Cost High

CHAPTER 13

APPENDIX

```cpp
#include <WiFi.h>
#include <PubSubClient.h>
#include <LiquidCrystal_I2C.h>
void callback(char* subscribetopic, byte* payload, unsigned int
              payloadLength);
#define ORG "vf1g00"
#define DEVICE_TYPE "DeviceType"
#define DEVICE_ID "54321"
#define TOKEN "Du@CS0CS9phctYRacI"
String data3;
LiquidCrystal_I2C lcd(0x27,16,2);
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/Data/fmt/json";
char subscribetopic[] = "iot-2/cmd/test/fmt/String";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
WiFiClient wifiClient;
PubSubClient client(server, 1883, callback, wifiClient);

void setup() {
  lcd.init();
  lcd.backlight();
  Serial.begin(115200);
  Wire.begin(4,2);
  lcd.setCursor(1,0);
  lcd.print("Hi");
  wificonnect();
  mqttconnect();
}
void loop()
{

  Serial.println("Take this medicine-Digene");
  delay(1000);
```

```
}

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()
{
  Serial.println();
  Serial.print("Connecting to ");
  WiFi.begin("Wokwi-GUEST", "", 6);
  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);
  data3 = "";
}
```

Github link:https://github.com/IBM-EPBL/IBM-Project-14265-1659547672

Demo Link:

1.https://drive.google.com/file/d/154YEk_Q3nZ5IrCs2xP-k7Xoy_T_R5Zy5/view?usp=share_link

2.https://drive.google.com/file/d/1onF8i2SlZwcTpm7HwvQKpB6tcQkbLon4/view?usp=share_link