IBM - NALAIYATHIRAN

THIAGARAJAR COLLEGE OF ENGINEERING

Department of Electronics and Communication Engineering

PERSONAL ASSISTANCE FOR SENIORS WHO ARE SELF RELIANT

Team ID: PNT2022TMID21391

TEAM DETAILS

TEAM-ID: PNT2022TMID21391

TEAM MEMBERS

Reg. No.	IBM Reg. No.	Name
19D058	917719D058	Nisha C
19D022	917719D022	Fathima D
19D028	917719D028	Harni V
19D132	917719D132	Sangeetha M

ABSTRACT

The history of agriculture began thousands of years ago. After gathering wild grains beginning at least 105,000 years ago, nascent farmers began to plant them around 11,500 years ago. Agriculture is the practice of cultivating plants and livestock. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities. Modern agronomy, plant breeding, agrochemicals such as pesticides and fertilizers, and technological developments have sharply increased crop yields, but cause ecological and environmental damage. Agriculture is the backbone of Indian Economy. The improvement of agriculture sector provides enormous opportunities for common folks, business people. So, in order to improve the farming methods, we use technology (Iot applications) rather than modern technology. This helps in providing precise condition of the farms which include temperature, humidity, range, soil conditions. This information when known to famers beforehand or to owners in their remote location helps them to improve the field and the farming conditions. The improved farming method thus result in increase in output

Content

1.INTRODUCTION

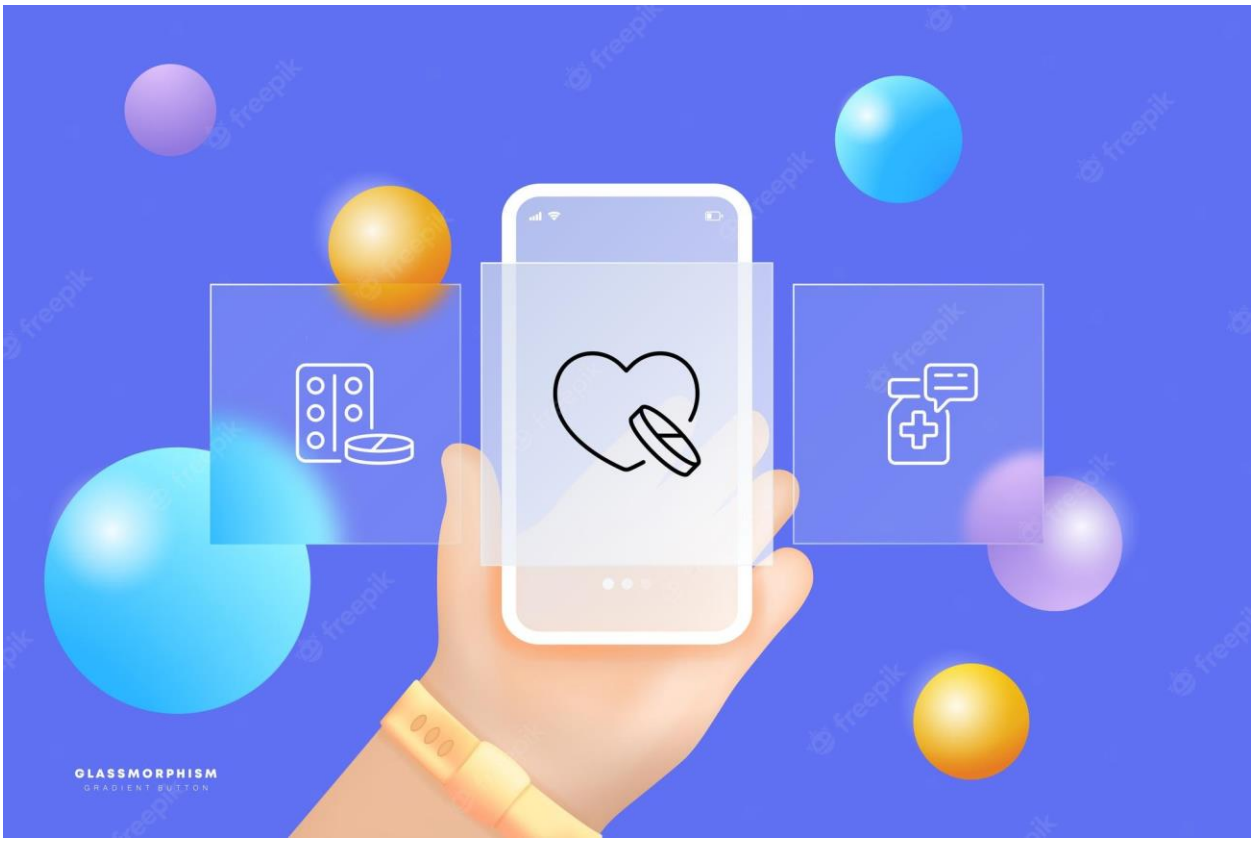


Fig.1.1. IoT based Medicine Remainder System

1.1 Project Overview

- Personal assistance application is especially meant for elders who may forget to take their daily medications on time. It is designed for users whoare in need to theirmedication schedule.

- It is difficult for doctors/caretakers to monitor the patients regularly. To avoid thisproblem, this medicine reminder system is developed, it helps to take medications at correct time.

- Personal assistance application will ask users to add the medicine names and time based upon their prescription, reminder will be updated which will be visible to the user. Also, users can get a voice commands to take their medications. They have an option to set an alarm which will notify

them to take medications, they can either stop or snooze the alarm as per their need.

1.2.Purpose

- Sometimes elderly people forget to take their medicine at the correct 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 theIBM IoT platform.The device will receive the medicine name and notify the user withvoice commands.

2.LITERATURE SURVEY

2.1.Existing problem

S.NO.	PAPER TITLE	AUTHOR NAME	PUBLICATION YEAR	RESULTS
1.	A Research on Home Automation for Elderly and Physically Challenged People by using IOT.	Chaitra N, Ashwini CS, Shyma Zaidi.	2019	In the paper , the main objective is to build smart home and to make the elderly and physically challenged population more self-dependent. Which is cheaper when compared to all The interfaced system so simple as possible so that it makes physically impaired people more efficiently use it. Here the system can be operated using google assistant and android application.
2.	HABITAT: An IoT Solution for Independent Elderly	Elena Borelli , Giacomo Paolini , Francesco Antoniazzi	2019	Here main aim is to provide flexible and extensive digital platform for Smart Homes is presented. The HABITAT (Home Assistance Based on the IOT for the autonomy of Everybody)is for assisting elderly and non-self-sufficient people in smart homes and embedding them in everyday life objects, thus reducing

				the expenses for healthcare due to the lower need for personal assistance.
3.	Development of an IoT-Based Health Promotion	Sathish Kumar, Nivedha, Anitha, Jayaprakash.	2020	In this paper they use the software which contains three core elements We-Watch, Service Board for We-Care and the cloud application. The We-Watch is composed of a discreet small bracelet which the elderly individual uses. This is responsible for tracking and gathering data from the available sensors. The solution alerts family members or appointed caretakers about sudden daily shifts
4.	Development of an IoT-Based Health Promotion System for Seniors	Chia-Hui Liu , Jih-Fu Tu .	2020	Using wireless technology combined with physiological measurement techniques and home care equipment can assist elderly individuals to promote health and the health care service at home. In this research the system is divided into three subsystems the IoT-based ,the context awareness-based service subsystem, and the elderly nutrition diet and health promotion subsystem

Table 2.1. Existing solutions

2.2.References

- https://ieeexplore.ieee.org/Xplore/home.jsp
- https://link.springer.com/

2.3.Problem Statement Definition

Our problem statement is to remind the elderly persons to take their medicines on correct time and monitor them.

Customer Problem Statement:

I am	I'm trying to	But	Because	Which makes me feel
A Caretaker	To monitor the elder people whether they take their medicine at the correct time	The elder people forget to take their medicine at the correct time	It requires medical remainder system for the elder people	It is difficult for the user to monitor the patient around the clock

3.IDEATION & PROPOSED SOLUTION

3.1.Empathy Map Canvas

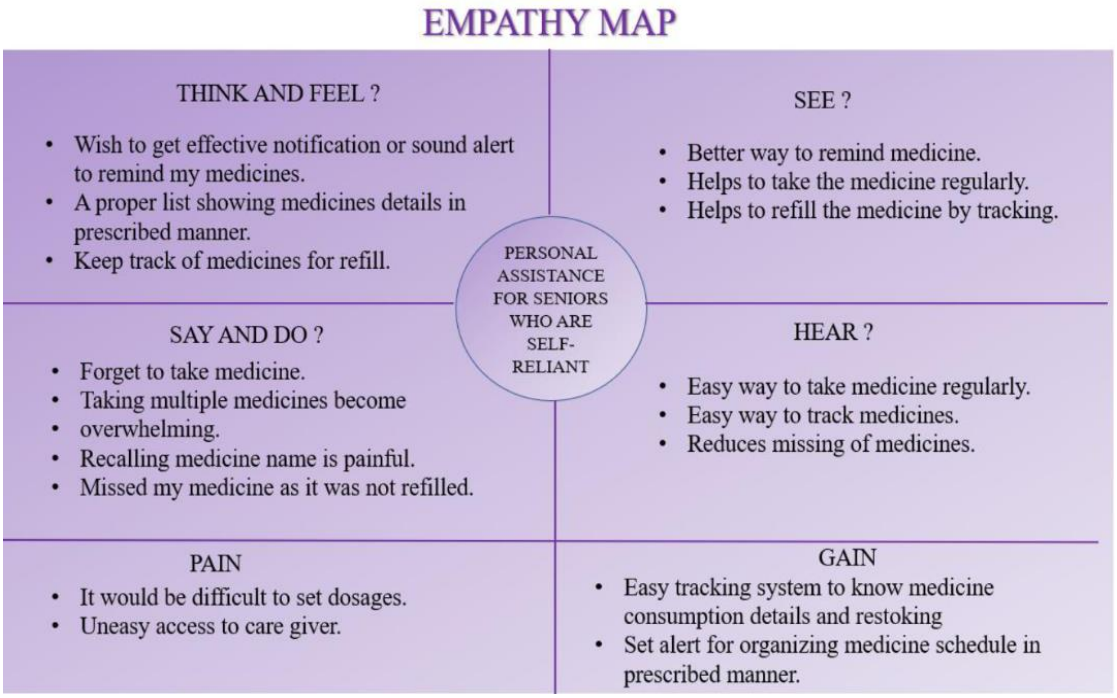


Fig 3.1. Empathy map

3.2.Ideation & Brainstorming

Step-1: Team Gathering, Collaboration and Select the Problem Statement

We have followed the first step of brainstorming, we have discussed as a team todecide a problem statement .As per the guideline the following is done

- TEAM GATHERING
- COLLABORATION
- DECIDING THE PROBLEM STATEMENT

Problem Statement:

A caretaker\doctor trying to monitor the elder people whether they take their medicine at the correct time.But the elder people forget to take their medicine at the correct time, so that it is difficult for the user to monitor the patient around the clock. To avoid this it requires medical remainder system for elders and notify the user with voice commands.

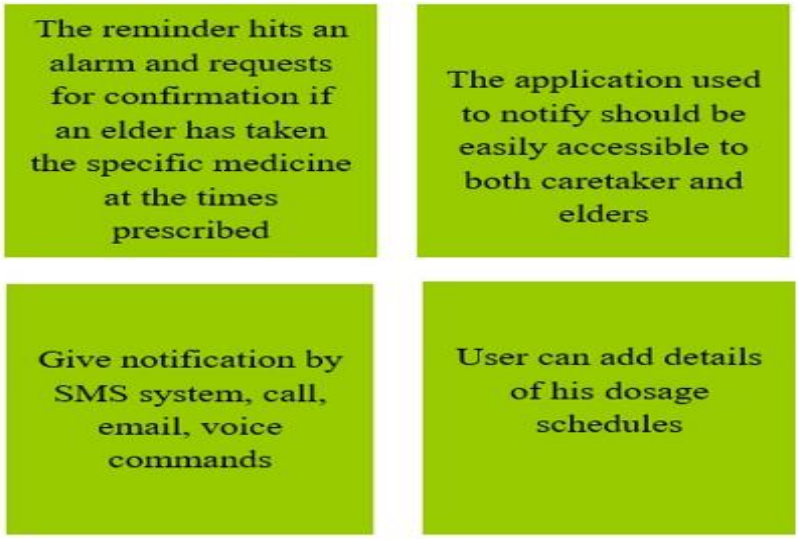
Step-2: Brainstorm, Idea Listing and Grouping

NISHA C		FATHIMA D	
The reminder hits an alarm and requests for confirmation if an elder has taken the specific medicine at the times prescribed	If not responded to, or responded negatively, the app sends a notification to the user	Notifying when the medicine box is empty	Alert when the medicine is expiring
Help to avoid unnecessary risk and serious illness	User can enter medicine and desired time manually in the application	The monitoring details can be shared to doctors	The application used to notify should be easily accessible to both caretaker and elders
HARNI V		**SANGEETHA M**	
Uphold an appropriate schedule to maintain body health	Give notification by SMS system, call, email, voice commands	User can add details of his dosage schedules	Feature which helps the person to track progress in health vitals such as sleep, weight, blood pressure, sugar level etc.
Medication histories of an elders can be monitored to give further medical tips	Reminder for the elderly to stay on schedule for their daily medicines	Alert sound or voice commands should be understandable and safe for an elders	The application should be customizable to user (care taker)

Table 3.1. Ideas of all the teammates

Step-3: Idea Prioritization:

Fig 3.3. Prioritization matrix



3.3.Proposed Solution

S.No.	Parameter	Description
1.	**Problem Statement (Problem to be solved)**	➢ Sometimes elderly people forget to take medicines at correct time ,to avoid this medicine remainder system is developed.
2.	**Idea / Solution description**	➢ In order to monitor elders we proposed medicine reminder system. An app is built for the user (caretaker) which enables them to set the desired time and medicine. ➢ These details will be stored in the Cloud DB. If the medicine time arrives the web application will send the medicine name to the IoT Device through the IoT platform. The device will receive the medicine name and notify the user with voice commands.

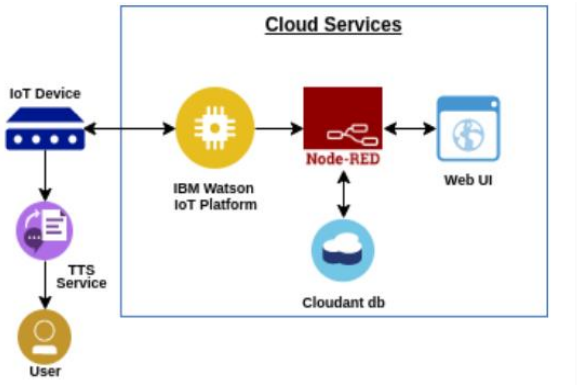
3.	**Novelty / Uniqueness**	➢ Digital Voice assistant technology ➢ Notification System.
4.	**Social Impact / Customer Satisfaction**	➢ This will be helpful for the caretakers/doctors for monitoring the health conditions of elders and also this creates positive impact on seniors health.
5.	**Business Model (Revenue Model)**	
6.	**Scalability of the Solution**	➢ In future increase the number of users, Maintains best possible user experience. ➢ Helps the elders to take medicines regularly ➢ And also helps to refill the medicines.

Table 3.2. Proposed solution

3.4.Problem Solution fit

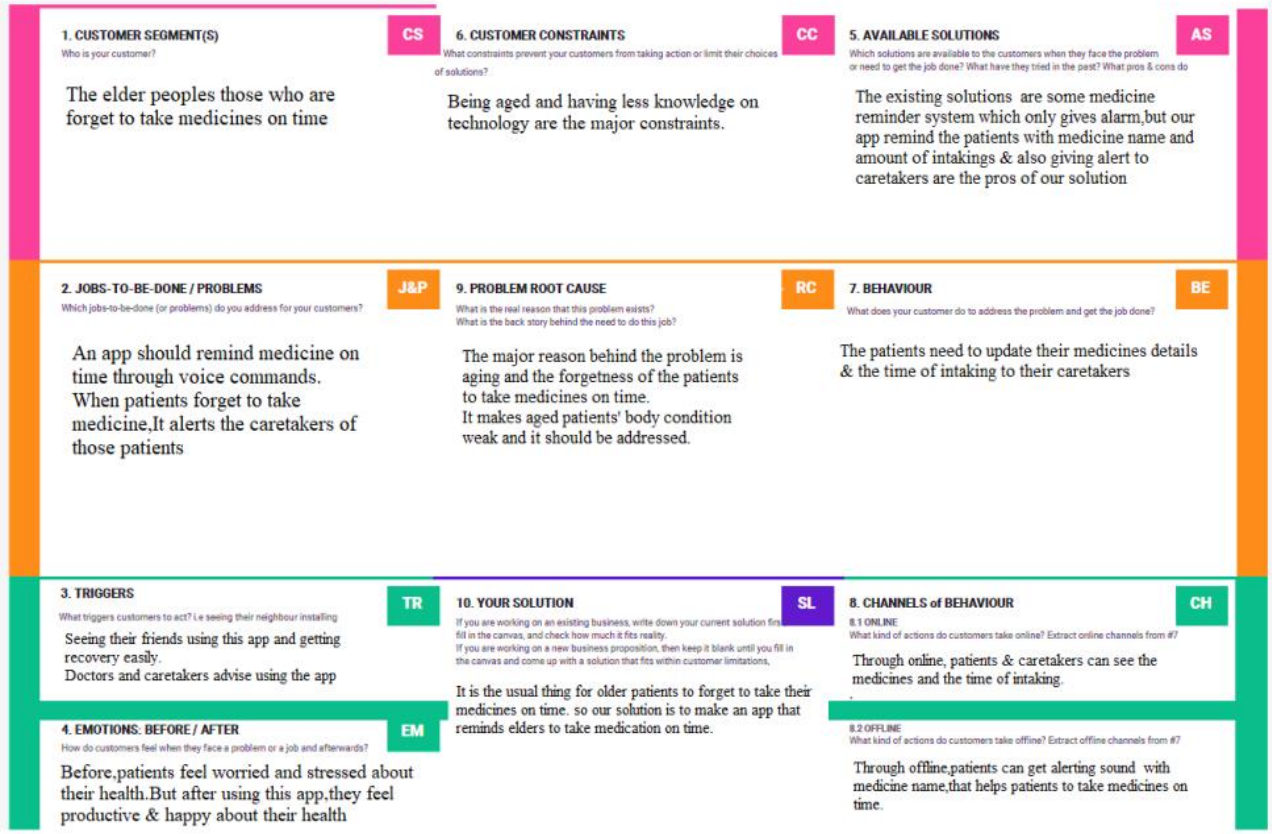


Fig 3.5. Problem fit

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 Registration	Registration can be done through Gmail or either using phone number.
FR-2	User Confirmation	Confirmation via Email or through Message.
FR-3	User Login (mobile app)	Login with registered mobile number and password
FR-4	User Medical Information	In the app user can enter the medicine details with date. Then set the time in the app for alarm remainder.

Table 4.1. Functional requirements

4.2.Non-Functional requirements

Following are the non-functional requirements of the proposed solution.

1.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	It is used to remind the medicine on time and it alerts the users through voice commands.
NFR-2	**Security**	The login information should not be

		accessed by anyother users than respective users and caretakers.
NFR-3	**Reliability**	It reminds on correct time. The user data will getupdated and examined after certain period of time.
NFR-4	**Performance**	The voice message will be delivered accurately to the given time.
NFR-5	**Availability**	It can be used by registered user from any place.
NFR-6	**Scalability**	It is easily adaptable. The device is compatible and portable.

2.

Table 4.2. Non – functional requirements

5.PROJECT DESIGN

5.1.Data Flow Diagram

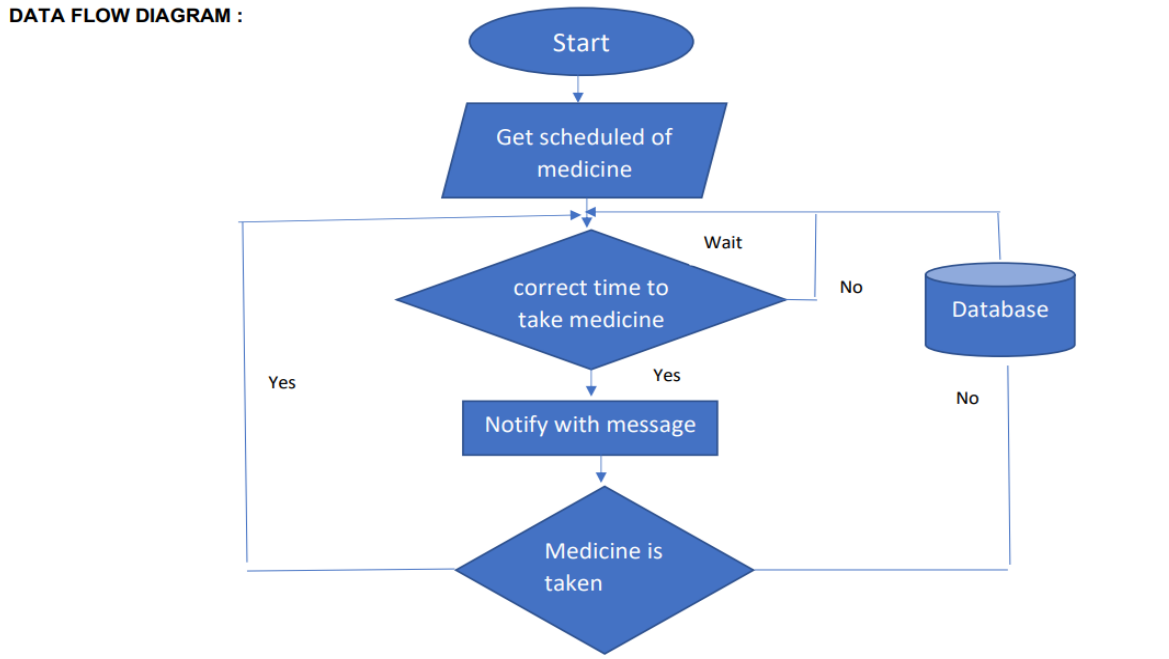


Fig 5.1. Dataflow diagram

5.2.Solution & Technical Architecture

Solution Architecture:

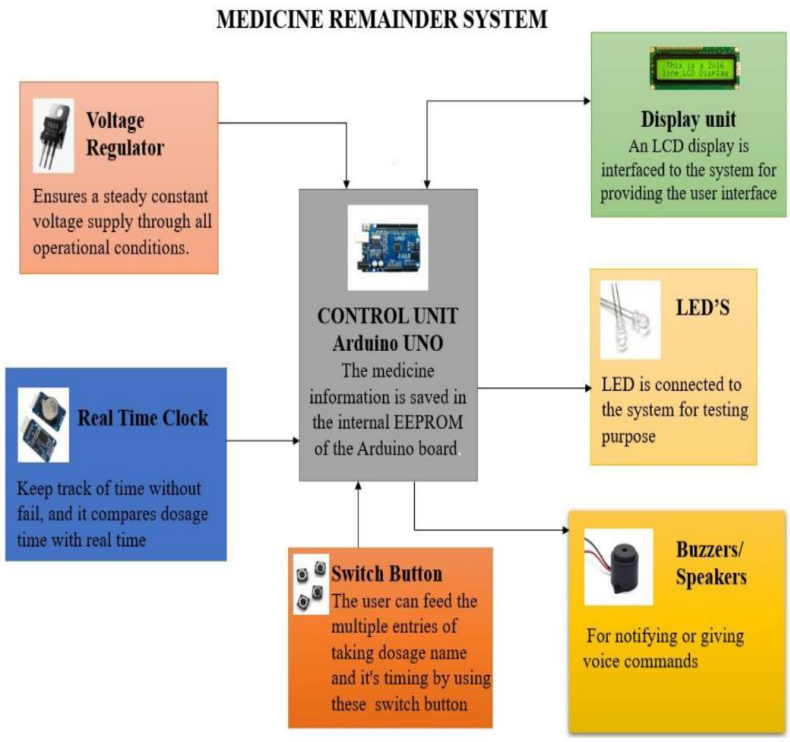


Fig 5.2. Solution architecture

Technical stack:

S. No	Component	Description	Technology
1.	User Interface	How user interacts withapplication e.g. Web UI, Mobile App etc.	HTML, CSS, JavaScript /Angular Js / React Js etc.
2.	Application Logic-1	Logic for a process in theapplication	Java / Python
3.	Application Logic-2	Logic for a process in the	IBM Watson TTS

		application	service
4.	Application Logic-3	Logic for a process in theapplication	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudantetc.
7.	Infrastructure (Server /Cloud)	Application Deployment onLocal System / Cloud	Local, Cloud Foundry, Kubernetes, etc.

Table 5.1. Components and technologies

S. No	Characteristics	Description	Technology
1.	Scalable Architecture	Can be used at ➢ Hospitals ➢ Old age Homes ➢ In working people homes where it will beused for elders	IOT(Internet Of Things)
2.	Availability	To remind to take medicine with uninterrupted services, we have to implemented in distributed service	IBM Cloud

3.	Performance	If it was implemented, it isgiven with medicine name and desired time	IBM Cloud DB,RTC DS1307 Module

Table 5.2. Application Characteristics

5.3.User Stories

User Type	**Functional Requirement (Epic)**	**User Story**	**User Story / Task**	**Acceptance criteria**	**Priority**	**Release**
Customer (Senior user)	Caretaker	USN-1	As a user, I want to take medicines on timeand monitor my health.	I want to take medicines on time.	High	Sprint-1
Customer (Diabetes Patient)	Smart medicinebox	USN-2	As a user, I want to take my tablets on time byvoice command.	I want to take my tabletson time by voice command.	High	Sprint-1
Customer (disabled person)	Smart medicine box	USN-3	As a user, I need to take my medicine in nearby places with	I need to take my medicine in nearby places with	Medium	Sprint-3

			notification.	notification.		

Table 5.3. User stories

6.PROJECT PLANNING & SCHEDULING

6.1.Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation:

Sprint	**Functional Requirement**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint-1	Medication Details	USN-1	As a user, I take the medicines that shouldintake daily and put them in the medicine box by the day order separetely	10	Low	Nisha C Fathima D Harni V Sangeetha M
Sprint-1		USN-2	As a user, by setting the particular time, medicine names the elders can be notified appropriately.	10	High	Nisha C Fathima D Harni V Sangeetha M
Sprint-2	Set Time	USN-3	As a user,I set the desired time,medicine	10	High	Nisha C Fathima D Harni V

			names and the dosages in the medicine remainder system.			Sangeetha M
Sprint-2		USN-4	The above setted details were stored in IBM Cloudant DB,which helps to notify the people on time	10	Medium	Nisha C Fathima D Harni V Sangeetha M
Sprint-3	Notification	USN-5	The time,medicine names and the dosagesare setted and these details were stored in IBM Cloudant DB. When the medicine time arrives the web application send the medicine name to the IOT device Arduino.	10	High	Nisha C Fathima D Harni V Sangeetha M
Sprint-3		USN-6	By that device elders can be notified and also caretaker can receive the conformation	10	High	Nisha C Fathima D Harni V Sangeetha M
Sprint 4	Monitoring	USN-7	In IBM	20	High	Nisha C

	andTracking healthStatus		Cloudant DB the time,medicine names and the dosages are stored.By which the elders medication and health records were keep on tracking			Fathima D Harni V Sangeetha M

Table 6.1. Estimation chart

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	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

Table 6.2. Burndown chart

6.2.Sprint Delivery Schedule

S.NO	ACTIVITY TITLE	ACTIVITY DESCRIPTION	DURATION
1	Literature Survey	Literature Survey on the selected project and gathering information byreferring the technical papers,research papers etc.	10 October 2022
2	Empathy Map	Prepare Empathy Map to know the user's thought,pain and gain.Also forpreparing list of problem statements	11 October 2022
3	Ideation and Brainstorming	List the ideas by brainstorming sessions.Prioritize the ideas that isfeasible and optimal.	13 October 2022
4	Problem Solution Fit	Prepare the Problem Solution Fit which describes the solution for the problem statement.	14 October 2022
5	Proposed Solution	Prepare the proposed solution document which includes the feasibility of idea,novelty,business model and scalability of solution.	17 October 2022

6	Solution Architecture	Defines the process of developing solution based on predefinedprocess.	18 October 2022
7	Customer Journey	Prepare Customer Problem Statement by customer interactions.From which optimalsolutions can be obtained.	20October 2022
8	Funtional Requirements	Prepare the Functional Requirements which specifies therequirements.	21 October 2022
9	Data Flow Diagram	Draw the data flow diagram basedon the problem statements.	22 October 2022
10	Technical Architecture	Prepare the Technical Architecturewhich describes the working.	24 October 2022
11	Prepare Milestone andActivity List	Prepare the milestones & Activity listof the project.	4 November 2022
12	Project Development andDelivery of Sprint 1,2,3,4	Develop and submit the developedcode by testing it.	IN PROGRESS

Table 6.3. Sprint delivery schedule

6.3.Reports from JIRA

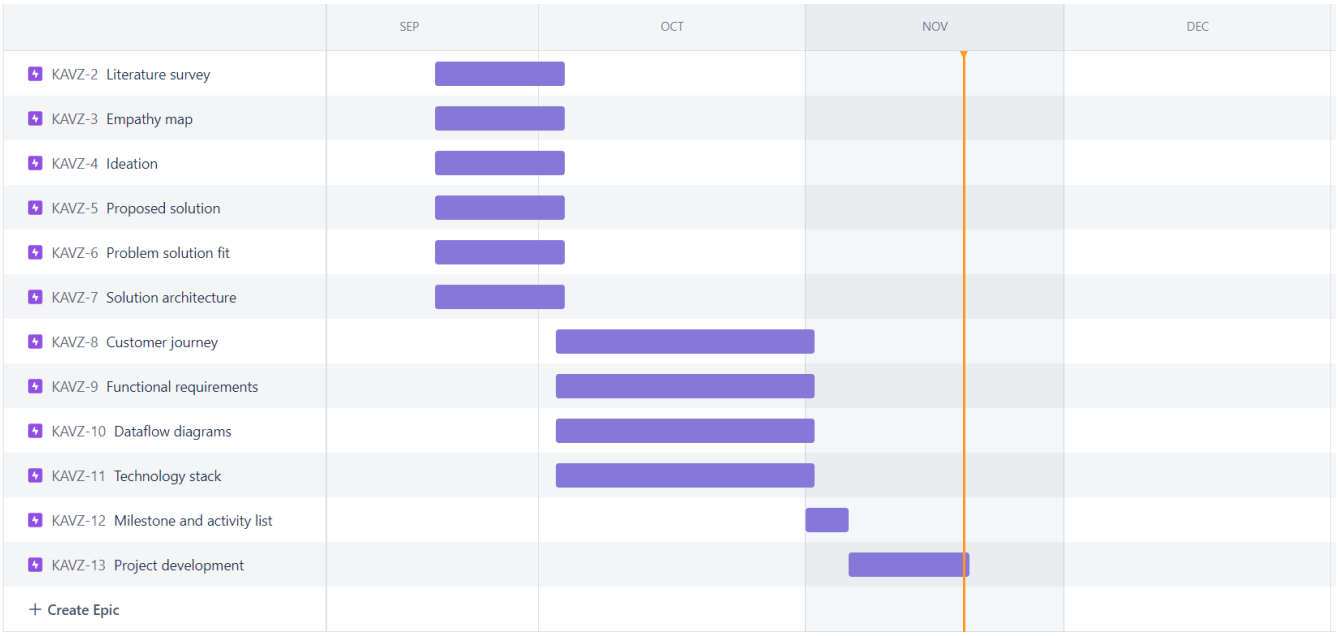


Fig 6.1. JIRA report

7.CODING AND SOLUTION:

7.1 FEATURE 1

MEDICINE.PY (PYTHON SCRIPT TO RECEIVE DATA FROM NODE-RED)

```
import time
#import ibmiotf.application
from ibm_watson import TextToSpeechV1
from ibm_cloud_sdk_core.authenticators import IAMAuthenticator
import ibmiotf.device
import pygame
pygame.init()

config={
    "org":"k54tgp",
    "type" :"abcd",
    "id":"123",
    "auth-method":"token",
    "auth-token":"123456789"
}
url="https://api.eu-gb.text-to-speech.watson.cloud.ibm.com/instances/3337f7ab-
eb47-4558-8344-cf4e0e94bee7"
api="ri9CfHaOitFC4s_8nN2fYhKmdVBku6yqzeedtTcCOQf1"
client= ibmiotf.device.Client (config)
client.connect()
auth=IAMAuthenticator(api)
tts=TextToSpeechV1(authenticator=auth)
tts.set_service_url(url)
```

```
def myCommandCallback (cmd):
    a=cmd.data
    instruction="Please Take following Medicine. "
    c=1
    if len(a["command"])==0:
        pass
    else:
        client.disconnect()
        client.connect()
        for i in a["command"]:
            instruction+=str(c)+". "
            instruction+=i
            instruction+=". "
            c+=1
        with open("./speech.wav","wb") as audio_file:
            res=tts.synthesize(instruction,accept="audio/mp3",voice='en-
US_AllisonExpressive').get_result()
            audio_file.write(res.content)
        play("speech.wav")

def play(a):
    p=pygame.mixer.Sound(a)
    pygame.mixer.Sound.play(p)
    time.sleep(20)
    pygame.mixer.Sound.play(p)
    time.sleep(20)
```

```
    pygame.mixer.Sound.play(p)
    time.sleep(20)

while True:
    client.commandCallback = myCommandCallback
client.disconnect()
```

FEATURES:

The first feature is the use of web application

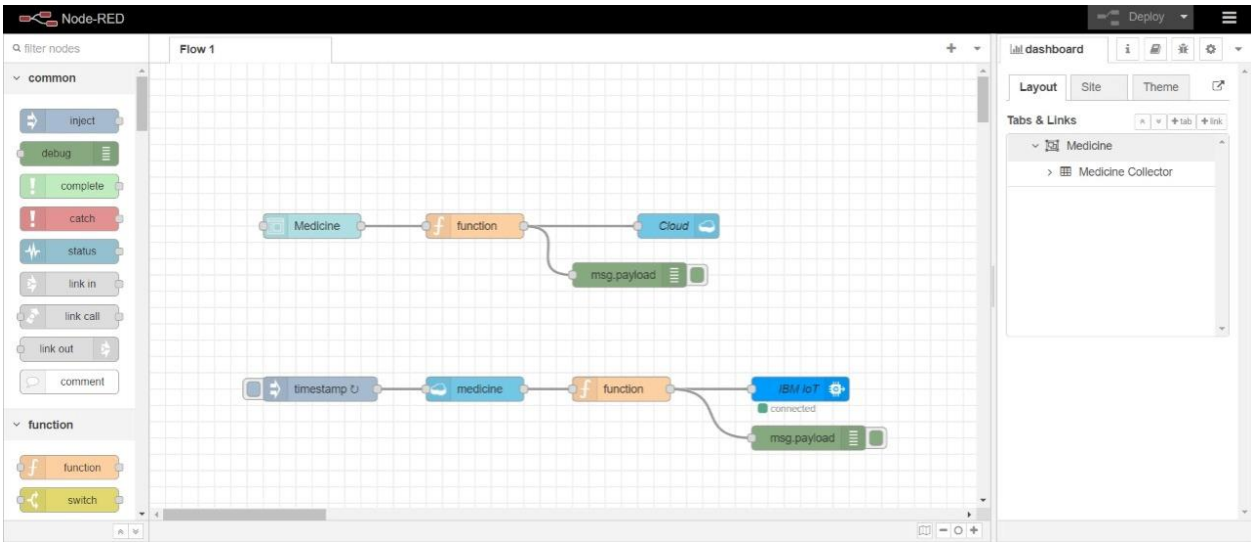
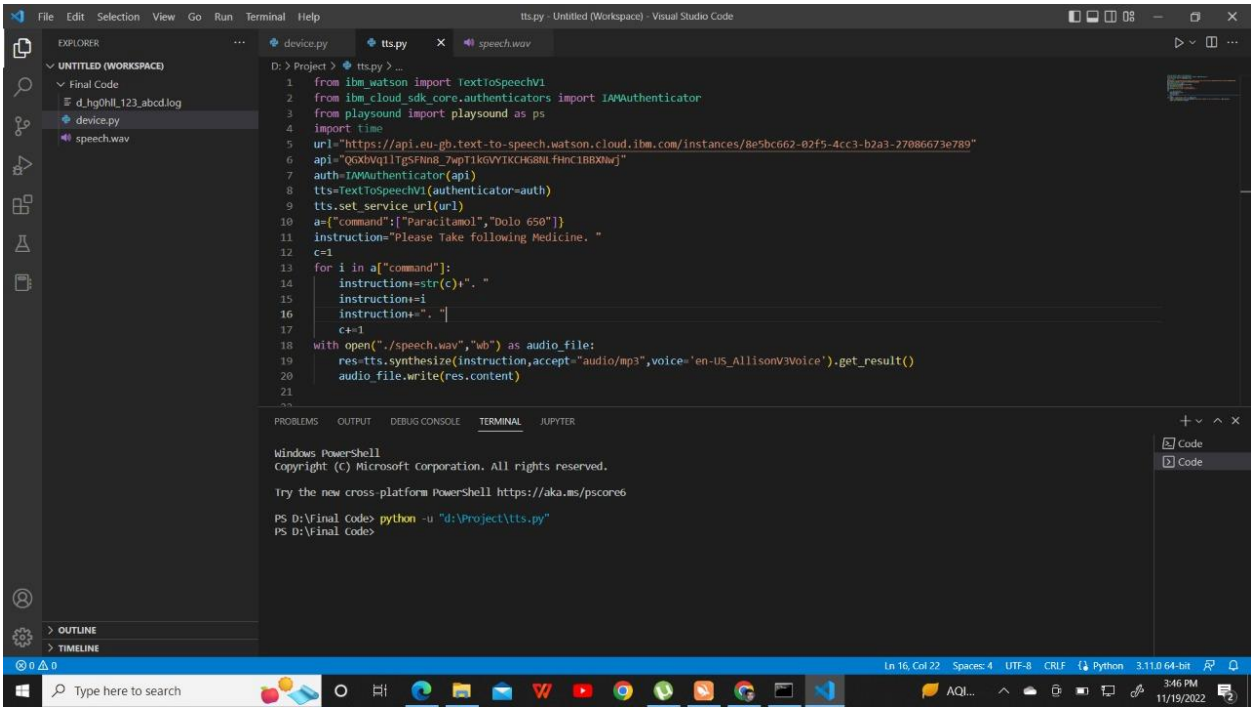


Fig. 7.1. Visual results in node red dashboard

7.2 TTS.PY (PROGRAM FOR ACCESSING TEXT TO SPEECH SERVICE) FEATURE 2:



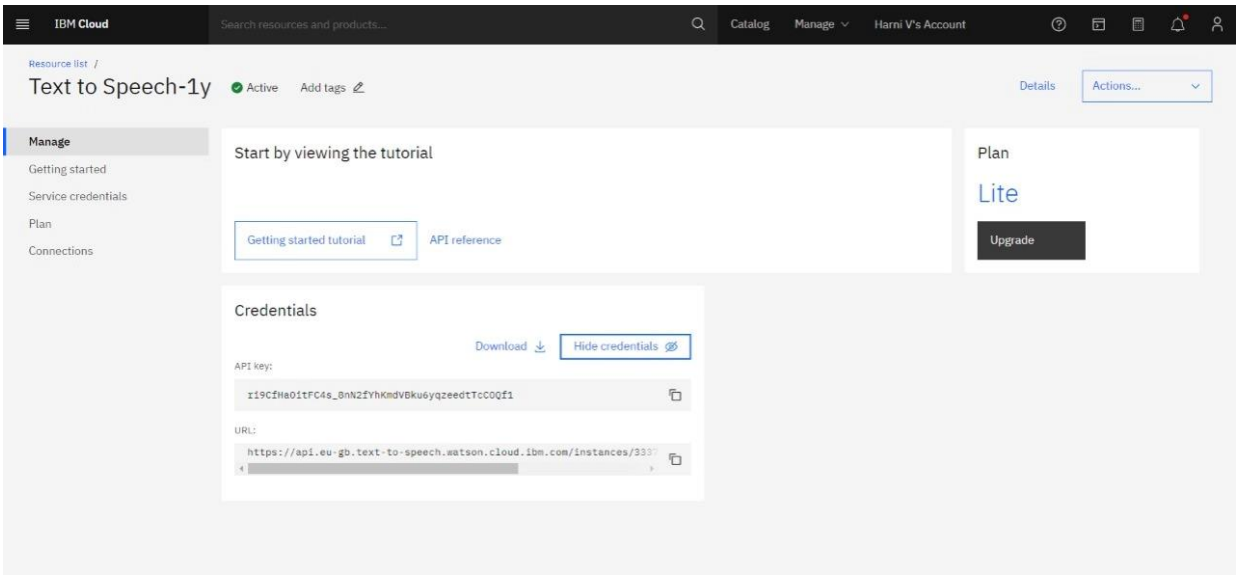


Fig. 7.2. Text to speech

7.3.DATABASE SCHEMA

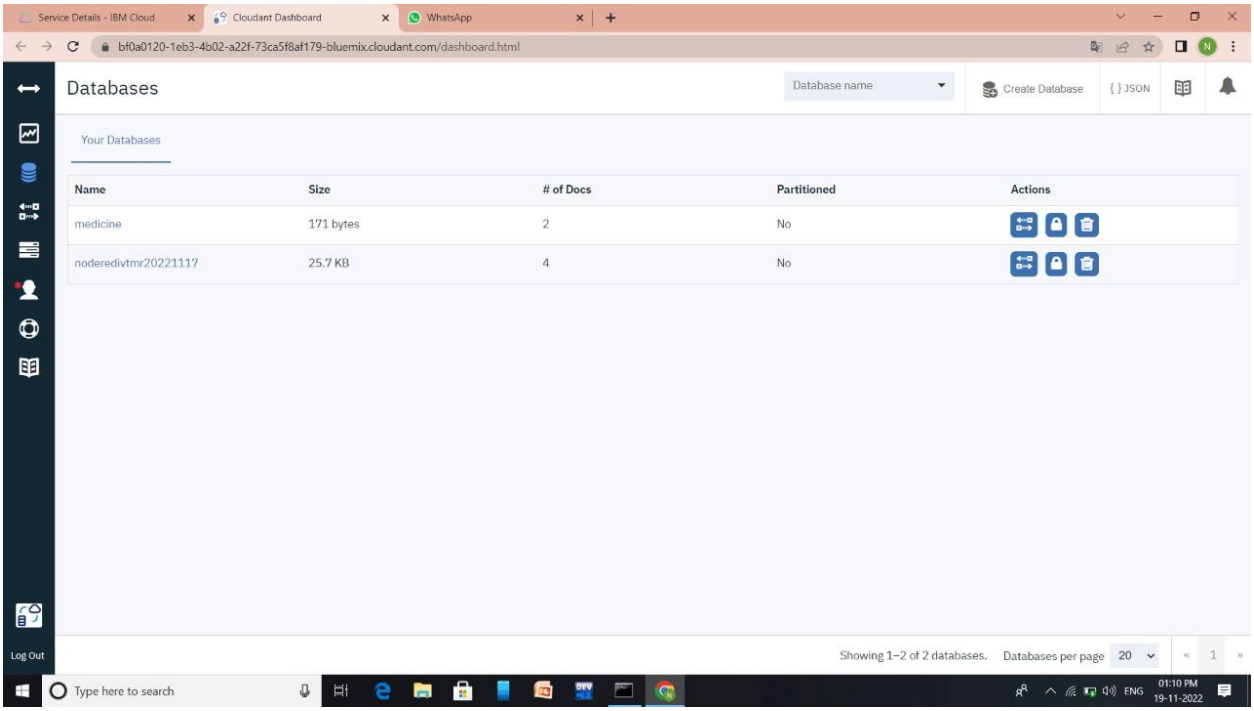
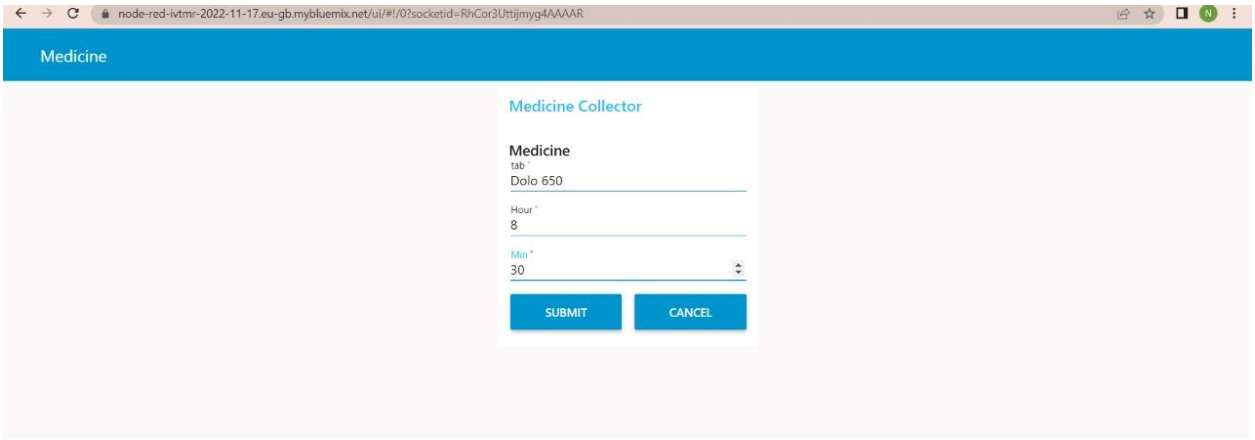
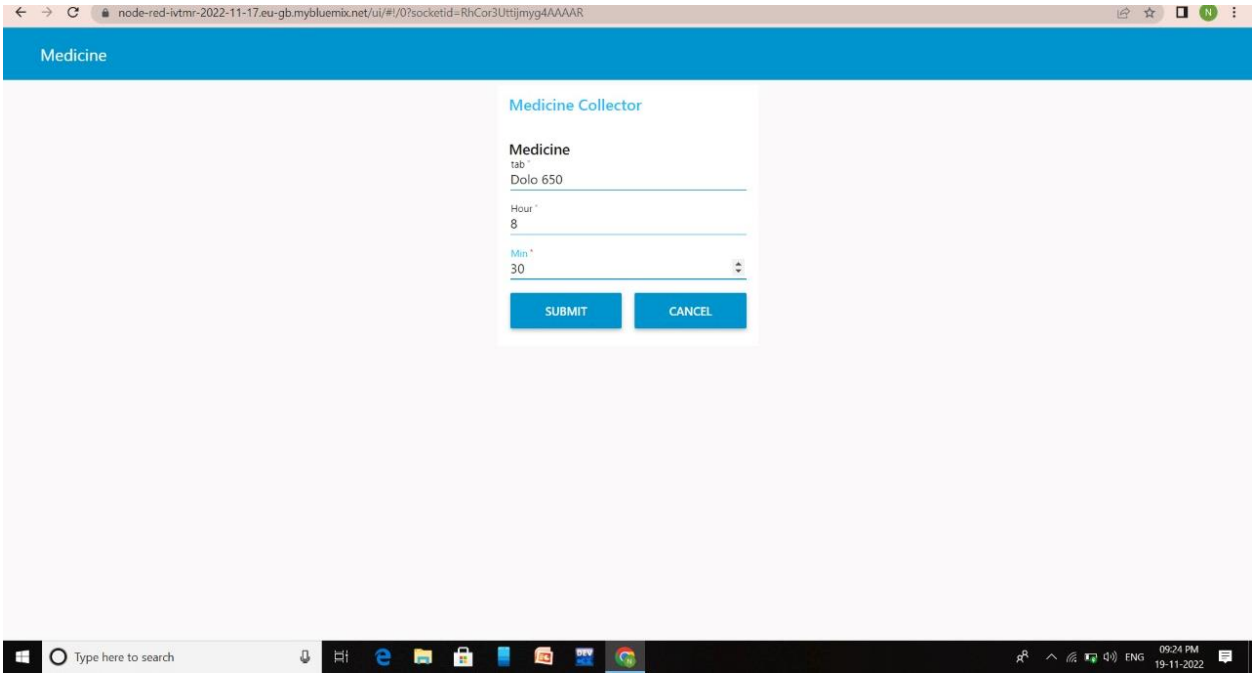


Fig. 7.3. Database

WEB USER INTERFACE:



APPLICATION :



Voice commands are also been generated

8.TESTING AND USE CASES:

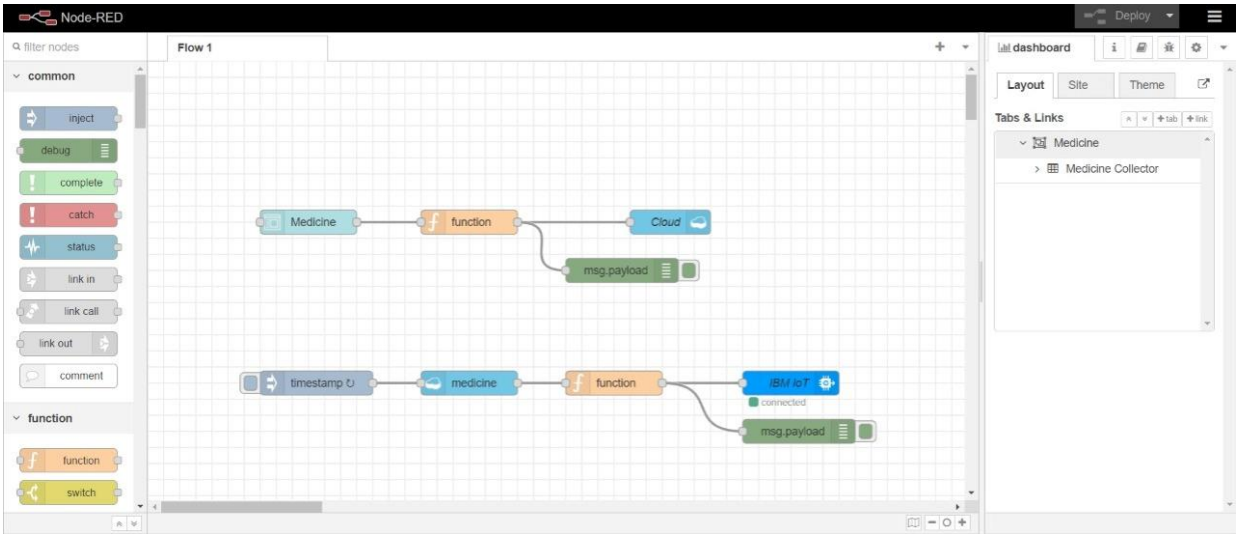
8.1.TEST CASES

S.No	MEDICINE NAME	TIME (H:M)	Expected output	Actual Output
1	Dolo	11:20	Alarm is set	Alarm is set
2	Flucold	12:00	Alarm is set	Alarm is set
3	Wikoryl	23:54	Alarm is set	Alarm is set
4	vicks	1:20	Alarm is set	Alarm is set

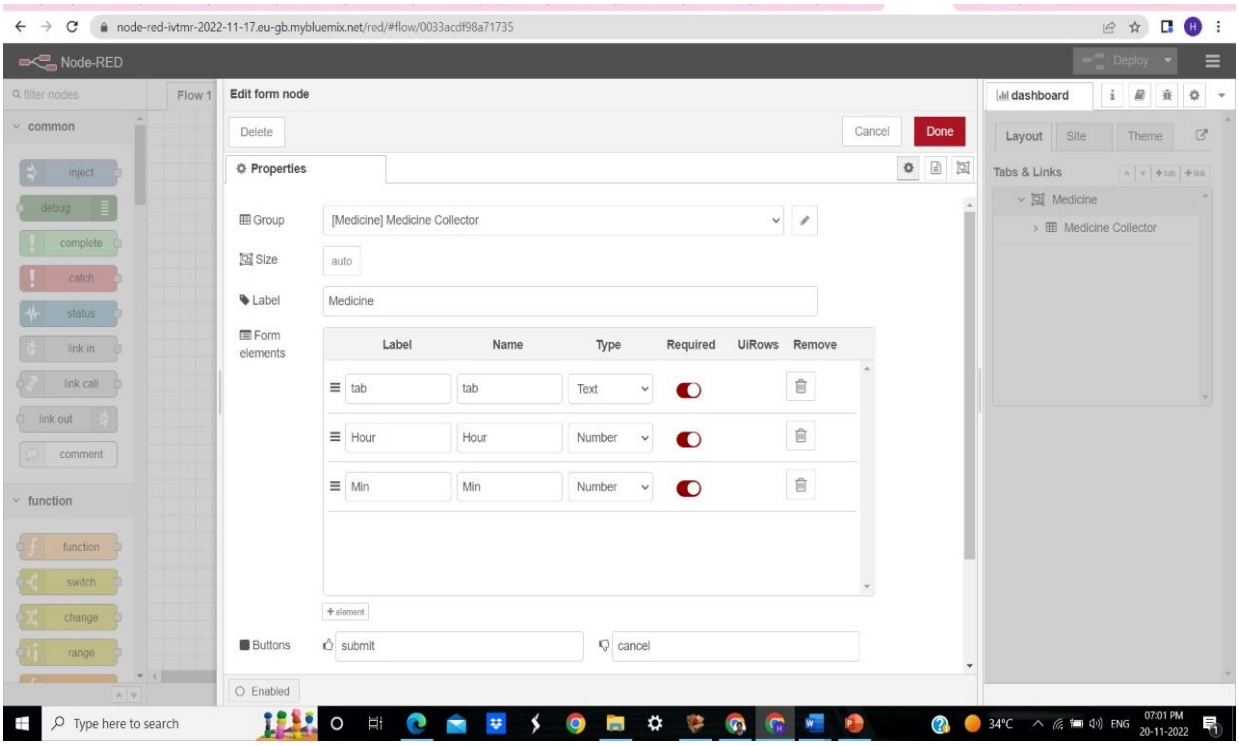
8.2.USER ACCEPTANCE TESTING

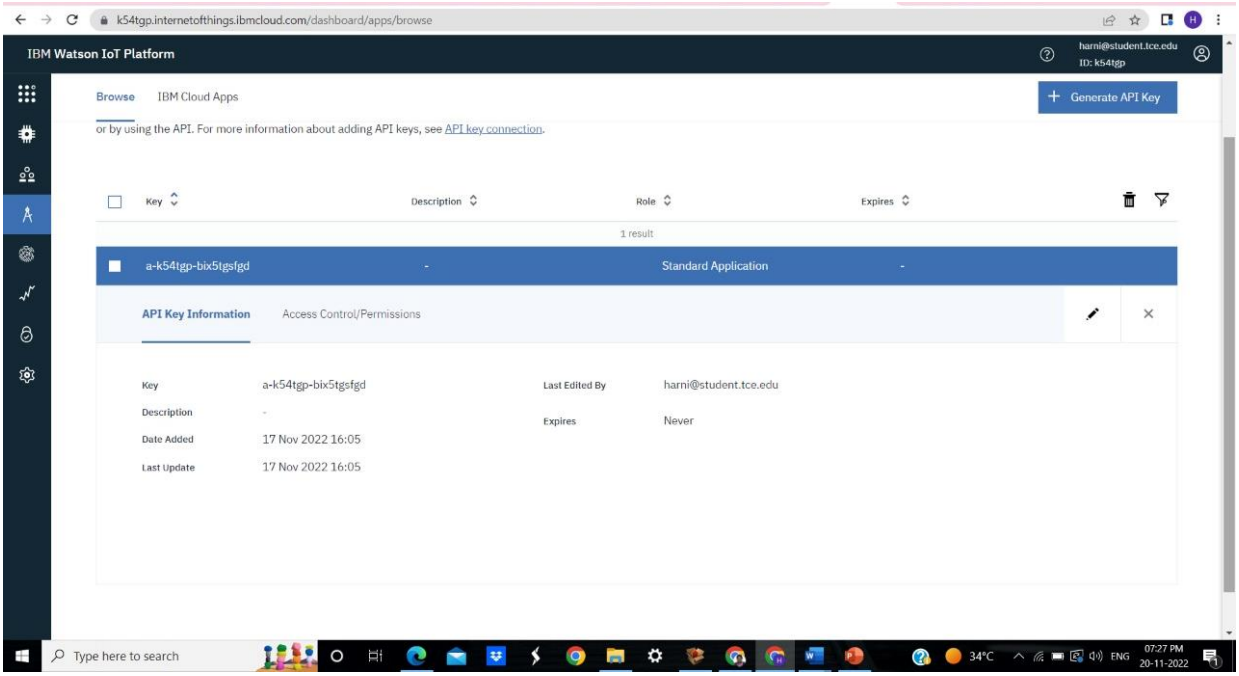
- The web application will be served to the user for setting reminder.
- The user can set alarm or reminder by running the application.
- Based on the medicine name and time entered in the app , an alarm is set and a voicecommand is played at the entered time.

9.RESULT:



Medicine name and time can be entered to get alert

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IBM Watson IoT Platform
harni@student.tce.edu
ID: k54tgp
Browse
IBM Cloud Apps
Generate API Key
or by using the API. For more information about adding API keys, see API key connection.
Key
Description
Role
Expires
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-
Standard Application
-
API Key Information
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Description
-
Date Added
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Last Update
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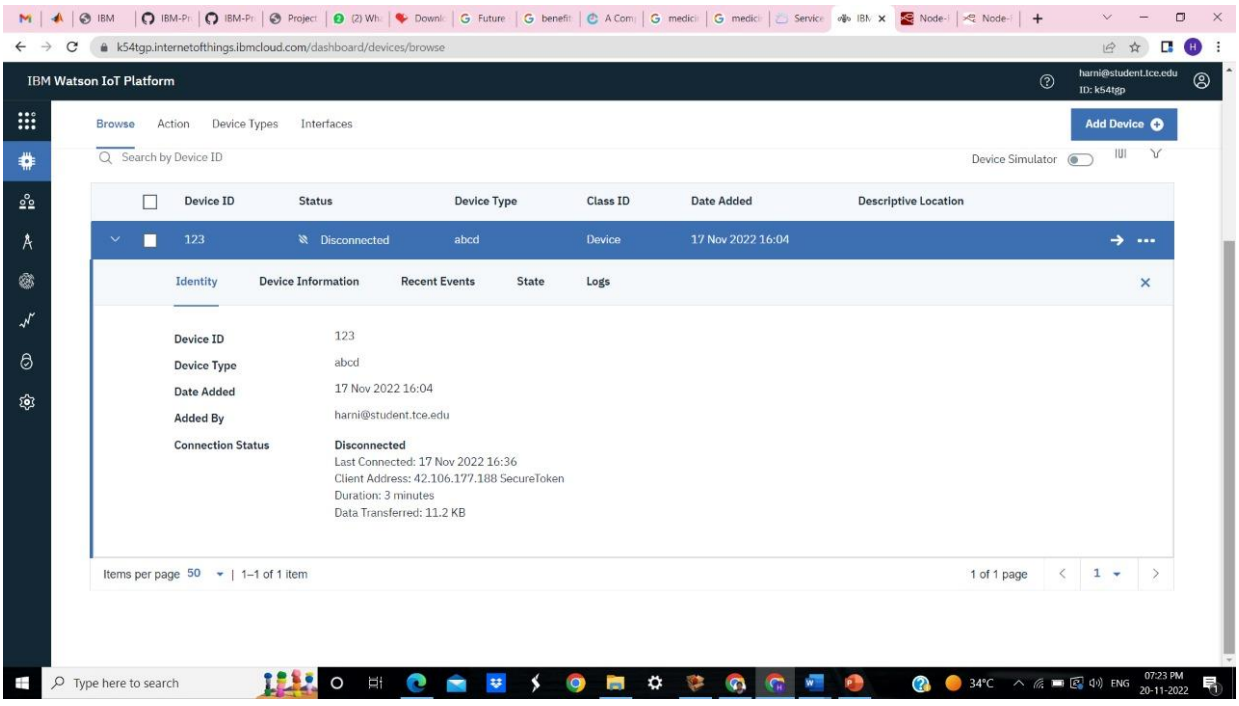
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harni@student.tce.edu
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Search by Device ID
Device Simulator
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Device Type
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Date Added
17 Nov 2022 16:04
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Connection Status
Disconnected
Last Connected: 17 Nov 2022 16:36
Client Address: 42.106.177.188 SecureToken
Duration: 3 minutes
Data Transferred: 11.2 KB
Items per page 50
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1 of 1 page
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07:23 PM
20-11-2022

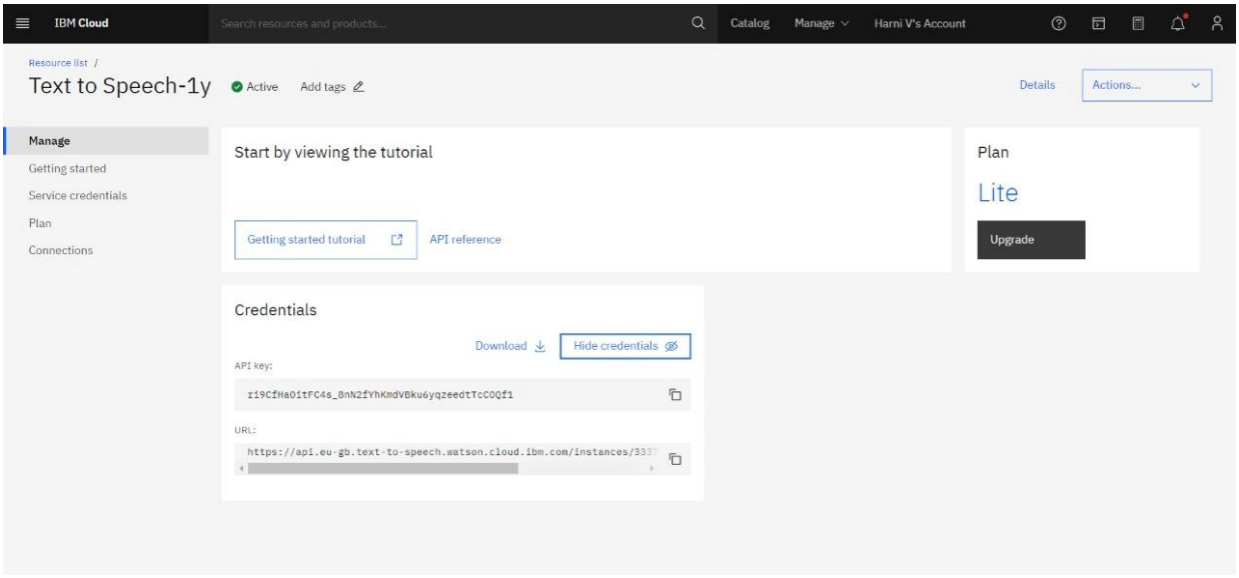

Fig 9.1. Results

10.ADVANTAGES AND DISADVANTAGES:

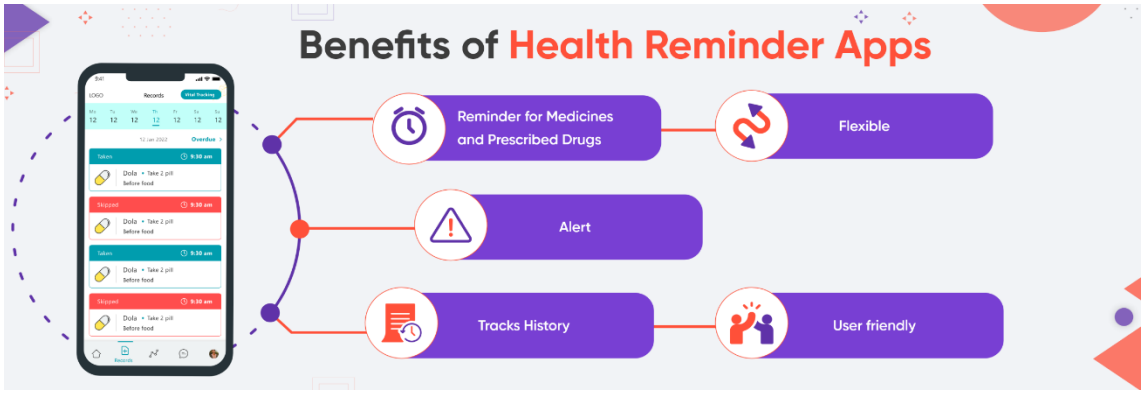

Fig. 10.1. Medicine Remainder Advantages

ADVANTAGES:

- Receiving remainders to take medications at correct time.
- Alarm is set at particular time as per the user requirement.
- Voice commands are received at particular time to take medications.
- No need of internet connection.

DISADVANTAGES:

- Possibility of run time problem when user enters two medicines at the same time..

11.CONCLUSION:

- The objective of this project was to design and develop a simple, reliable, efficient medicine remainder system that has a precise and quick notification mechanism. Appropriate services were used to make reminder alarm and voice commands .A step-by- step approach was followed in the design of the system. The design was carried out based on the study and analysis of existing similar systems and user perceptions. Several tests were conducted, and the results were analysed to ensure that the system produced the intended results. The system has been implemented and tested, showing satisfactory performance.

12.FUTURE SCOPE:

Fig. 12.1. Future scope

Health information:

The application helps family members to keep track of medicines.

Alert message:

If medicines are out of stock it gives alert message.

Order nearby:

We can order medicines in nearby pharmacy.

Users:

Single point to multi point user.

13.APPENDIX:

SOURCE CODE:

```
 import time
#import ibmiotf.application
from ibm_watson import TextToSpeechV1
from ibm_cloud_sdk_core.authenticators import IAMAuthenticator
import ibmiotf.device
import pygame
pygame.init()

config={
    "org":"k54tgp",
    "type" :"abcd",
    "id":"123",
    "auth-method":"token",
    "auth-token":"123456789"
}
url="https://api.eu-gb.text-to-speech.watson.cloud.ibm.com/instances/3337f7ab-
eb47-4558-8344-cf4e0e94bee7"
api="ri9CfHaOitFC4s_8nN2fYhKmdVBku6yqzeedtTcCOQf1"
client= ibmiotf.device.Client (config)
client.connect()
auth=IAMAuthenticator(api)
tts=TextToSpeechV1(authenticator=auth)
tts.set_service_url(url)
```

```
def myCommandCallback (cmd):
    a=cmd.data
    instruction="Please Take following Medicine. "
    c=1
    if len(a["command"])==0:
        pass
    else:
        client.disconnect()
        client.connect()
        for i in a["command"]:
            instruction+=str(c)+". "
            instruction+=i
            instruction+=". "
            c+=1
        with open("./speech.wav","wb") as audio_file:
            res=tts.synthesize(instruction,accept="audio/mp3",voice='en-
US_AllisonExpressive').get_result()
            audio_file.write(res.content)
        play("speech.wav")

def play(a):
    p=pygame.mixer.Sound(a)
    pygame.mixer.Sound.play(p)
    time.sleep(20)
    pygame.mixer.Sound.play(p)
    time.sleep(20)
    pygame.mixer.Sound.play(p)
    time.sleep(20)
```

```
while True:
    client.commandCallback = myCommandCallback
client.disconnect()
```

PROJECT DEMO LINK: