PERSONAL ASSISTANCE FOR SENIORS WHO ARE SELF-RELIANT

TEAM ID: PNT2022TMID29810

Team Member:

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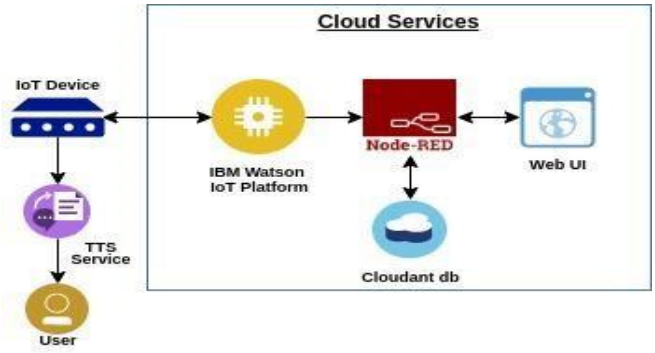
Vasumathi S	610519104110

Chapter - 1
INTRODUCTION

Project overview

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.



IBM watson Iot platform A fully managed,cloud-hosted service with capabilities for device registration,connectivity and data storage.Node red is a programming tool for wiring together hardware devices. Cloudant db handle software and hardware provisioning. Web UI a modern frame for fulfilling your designing needs.TTS service a type of assistive technology that reads digital text aloud.

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1.2 Purpose

Medication reminders serve as a good way to stay on track and uphold an appropriate schedule. It is a strategy for engaging with patients and caregivers to create a complete and accurate medication list .It is designed to assist the patient who forgets to take medicine,patients will no longer have to worry about daily medication. The application will remaind when it’s time to take medicine. The mobile application is used for keeping the record in medicine details and reminding the schedule of medicine. Real-time remote monitoring via connected IoT devices and smart alerts can diagnose illnesses, treat diseases and save lives in case of a medical emergency. Smart sensors analyze health conditions, lifestyle choices and the environment and recommend preventative measures, which will reduce the occurrence of diseases and acute states. IoT reduces costly visits to doctors and hospital admissions and makes testing more affordable. Accessibility of electronic medical records allow patients to receive quality care and help healthcare providers make the right medical decisions and prevent complications. IoT devices help track the administration of drugs and the response to the treatment and reduce medical error. Using IoT devices, healthcare authorities can get valuable information about equipment and staff.

Chapter - 2
LITERATURE SURVEY

1.REFERENCE PAPER:

Automatic Medicine Reminder Using Ardino

AUTHOR:

Waleed Humaid

DESCRIPTION:

This framework comprises of an ATMEGA328P micro controller with an inbuilt EEPROM and a continuous circuit. Every one of the passages made on the keypad are simultaneously and at the same time showed on the LCD board of the gadget. It will give an alert and the LCD will show the drug to be taken at the updated time.

2.REFERENCE PAPER:

IOT Based Pill Reminder and Monitoring System

AUTHOR:

Sultan Ahmad, Mahamudul Hasan

DESCRIPTION:

The proposed system consists of an IoT enabled device and an android application. Patients will no longer worry about daily medication. In the mobile application, medicine details are recorded and reminders are sent about medicine schedules. The device can sense whether a patient has taken medicine or not with the help of the infrared (IR) sensor.

3.REFERENCE PAPER:

A Case Study of Medication Reminder System

AUTHOR:

Mohammad Alhaj ,Abdullah Nizar

DESCRIPTION:

Medication management can include everything from using the devices that issue reminders to patients to take their medications. To fill the pill cases for patients and to mark the lid of each compartment to indicate the content to patients. We use HW/SW Co-design approach to allow the hardware and software of the system. It is designed and implemented to make sure that the non-functional properties are met.

2.3 PROBLEM STATEMENT:

In a world with an accelerated population aging, there is an increasingly interest in developing solutions for the elderly living assistance. The Internet of Things is a new reality that is completely changing our everyday life, and promises to revolutionize modern healthcare by enabling a more personalized, preventive and collaborative form of care. Aiming to combine these two important topics, this system is about an IoT -ready solution for the elderly living assistance which is able to remind them. 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. This result will help the elderly patients to manage their health care properly

Chapter – 3

IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS:

3.2 Ideation

TOP 3 IDEAS

- With IOT, it enables the Arduino UNO to take medicines 1 or 2 or 3 times a day. The time slot can be selected using push buttons. When user selects desired slots by pressing push buttons, the user input will be recorded.

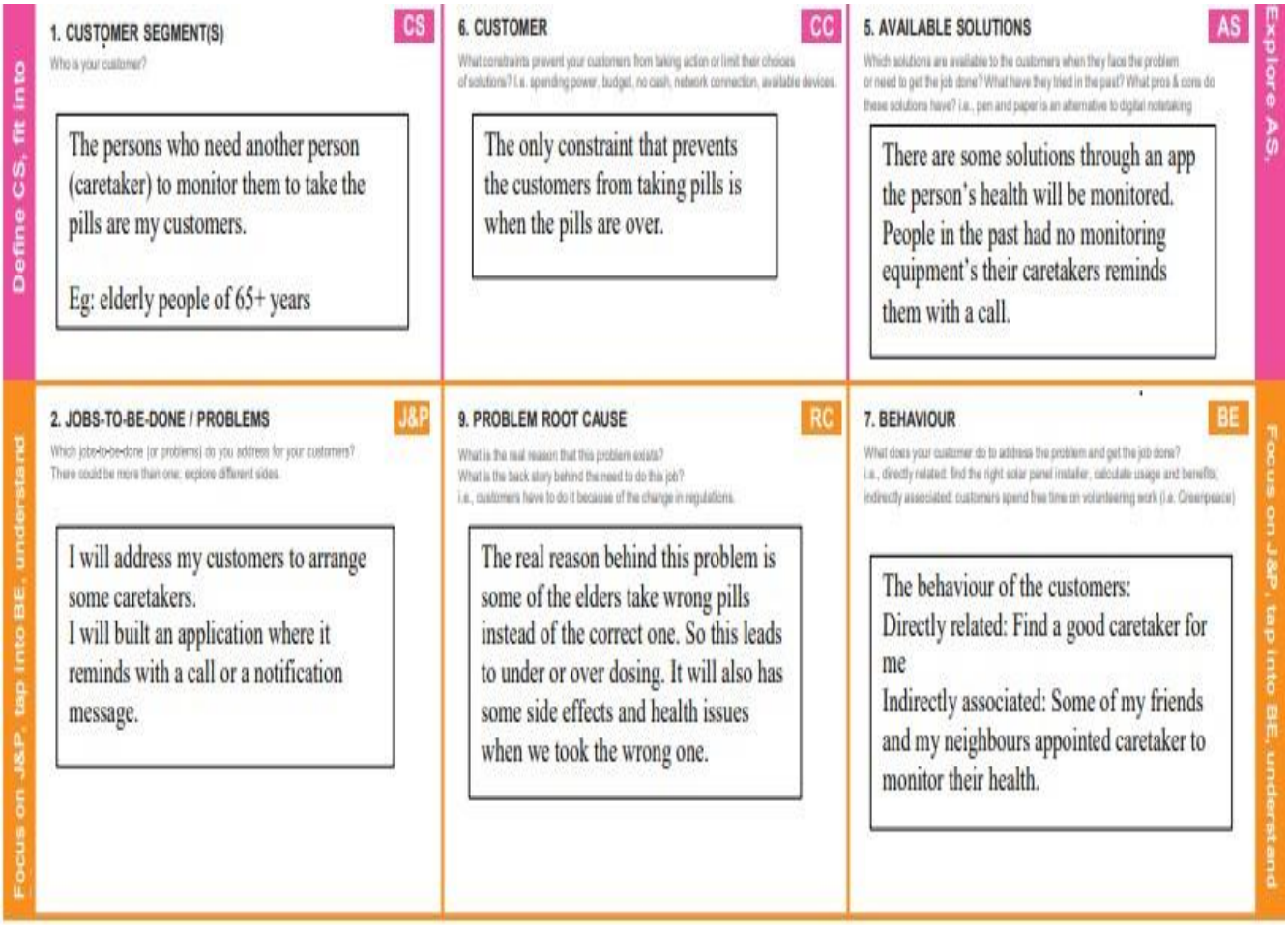
- An ATMEGA328P microcontroller with an inbuilt EEPROM and a continuous circuit. It will give sound alert. In addition to the fact that it has an alert framework, yet additionally a LCD which shows the drug to be taken at the updated time.

- An IOT enabled device and an android application. The mobile application is used for keeping the record in details and reminding the schedule of medicine. The device can sense whether a patient has taken medicine or not with the help of the infrared (IR) sensor

Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Sometimes the elderly forgets to take their medication at the appropriate time. And it is difficult for doctors/caretakers to monitor the patients around the clock.To avoid this problem, this automatic medicine reminder system is developed.
2.	Idea / Solution description	An app is built for the user which enables him to set the desired time and medicine. If the medicine time arrives the web application will send the medicine name to the IOT device through the IBM IOT platform.
3.	Novelty / Uniqueness	The uniqueness of the project is to notify the user with the voice commands.
4.	Social Impact /Customer Satisfaction	It promotes safe independent living, leading to happier and healthier cared for individuals.
5.	Business Model (Revenue Model)	We can sell it as subscription service.
6.	Scalability of the Solution	Without the user also, this system will provide voice commands to the updated time.

PROBLEM SOLUTION FIT



Chapter - 4

REQUIREMENT ANALYSIS

4.1Functional requirement

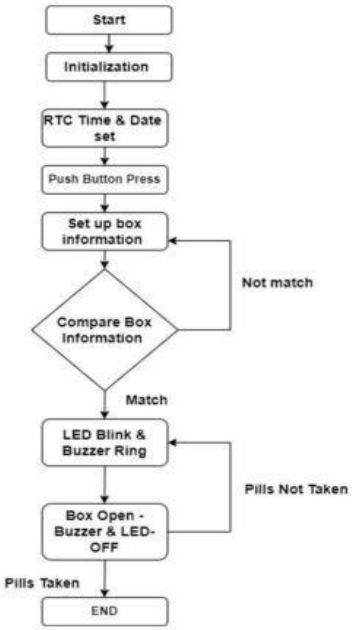
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Access Cloud services	Access the cloud service with the correct credentials Store the details in the database
FR-4	IOT configuration	Fine Tuning the IOT device based on Access to the Cloud DB via the device Manage the request and response effectively

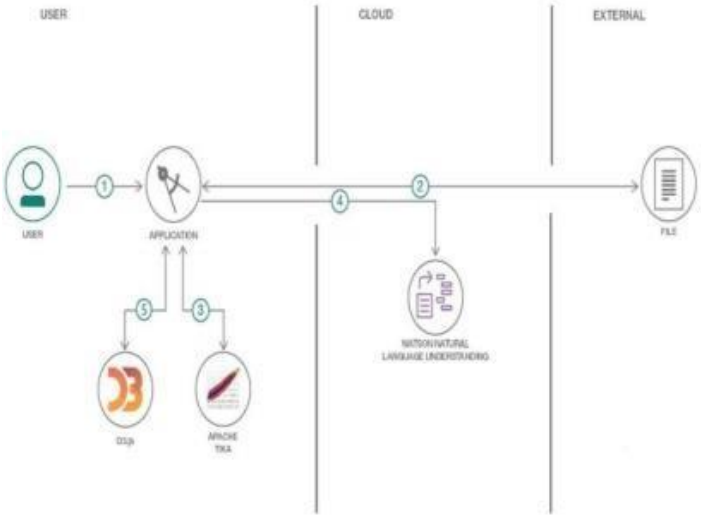
4.2Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	App can be used by anyone who has knowledge about internet and computer
NFR-2	**Security**	For security, TFA is enabled and biometrics are also added for user safety
NFR-3	**Reliability**	Highly reliable since, It uses Trusted clo ud services like IBM
NFR-4	**Performance**	Performance is better compared to other market products
NFR-5	**Availability**	Available on mobile app
NFR-6	**Scalability**	Using Cloud services, makes the scalability higher the using traditional database

CHAPTER 5
PROJECT DESIGN

5.1 Data Flow Diagrams



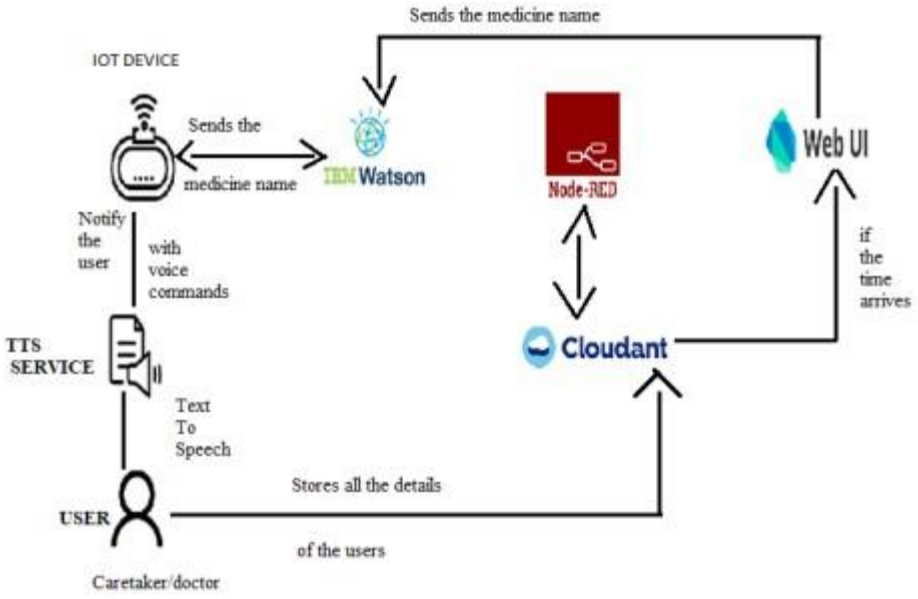


5.2USER STORIES

User Type	Functional Requirement(Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Senior citizen)	Caretaker	USN-1	As a user, I want to take Medicines on time and monitor my health	I want to Take Medicines On time	High	Sprint-1
Customer (Alzheimer's patient)	Smart medicine box	USN-2	As a user, I want to take my tablets on time by voice command	I want to take my tablets on time by voice commands	High	Sprint-1
Customer (Mentally idled patient)	Caretaker	USN-3	As a user, my patient needs to take medicines on time and monitor the activity	My patient needs to take medicines on time	Medium	Sprint-2
Customer (Coma patient)	Caretaker	USN-4	As a user, my patient medication time and prescription should load in a database for the upcoming week	My patient medication time and prescription should be in the database list	Low	Sprint-4
Customer (Disabled people)	Smart medicine box	USN-5	As a user, I need to take my medicine in nearby places with light notification	I need to take my medicine in nearby places with light notification	Medium	Sprint-3

5.3SOLUTION ARCHITECHTURE:

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.



SOLUTION ARCHITECHTURE

5.4TECHNOLOGY STACK (ARCHITECHTURE &STACK)

5.4.1 COMPONENTS & TECHNOLOGIES

S. NO	COMPONENT	DESCRIPTION	TECHNOLOGY
1	User Interface	Mobile App	HTML, CSS, JavaScript, Python
2	Application Logic-1	Mobile App to enter the Medicine Details weekly	HTML, CSS, JavaScript, Python
3	Application Logic-2	Gets the medication data from database	IBM Watson IOT API Call data
4	Application Logic-3	Converts the text to speech to pronunciation for the user	IBM Watson Assistant
5	Database	Medication time and tablets name	MySQL
6	Cloud Database	Call the data IBM Cloudant is used and user login credentials	IBM DB2, IBM Cloudant
7	File Storage	App code and IOT credentials are stored and API keys	IBM Block Storage
8	External API-1	To get the medicine box status Open or not	IBM box status API
9	External API-2	To get the login credentials in IBMDB2	Username and Password API
10	Machine Learning Model	To convert the text into speech for voice command the tablet details	Text to speec
11	Infrastructure (Server / Cloud)	To host the server and application	Cloud Foundry ,Node Red

5.5APPLICATION CHARACTERISTICS

S. No	Characteristics	Description	Technology
1	Open-Source Frameworks	To develop the application interface, we use MIT App Inventor	MIT App Inventor
2	Security Implementations	To secure the users login credentials and personal information	SHA-256, OWASP
3	Scalable Architecture	To scale the application database	IBM Auto scaling
4	Availability	To make use the application and data are available 24/7	IBM Cloud load balancer
5	Performance	To increase the performance the application In hosted in the high performance instance	IBM instance

Chapter - 6

PROJECT PLANNING & SCHEDULING

6.1Sprint Planning & Estimation

Sprint	Functional Requirement	User Story Number	User Story / Task	Story points	Priority	Team member
Sprint 1	Set Alarm	USN-1	As a user, I can set an alarm to alerting a medicine through medicine remainder system	**10**	High	Megavardhini S pooja S
Sprint 1		USN-2	As a user, I can Activate and Deactivate the alarm	**10**	High	Megavardhini S Sri swetha S
Sprint 2	notification	USN-3	As a user once I can the set the alarm then I can gets the notification	**10**	High	Megavardhini S Vasumathi S
Sprint 2		USN-4	As a user, If I requires this system then a notification will be sent into his device.	**10**	High	Megavardhini S pooja S Sri swetha S
Sprint 3	**medication details**	USN-5	As a user, I have multiple medications each day, I can put each pill in the box for the corresponding day.	**10**	High	Sri swetha S Megavardhini S Vasumathi S
Sprint 3		USN-6	As a user, between setting an alarm and using a pillbox, I will be able to stay on top of your medications and not miss a dose	**5**	**Low**	Megavardhini S Vasumathi S Pooja S
Sprint 3		USN-7	As a user, I can store the name of the medicine with its description	**10**	High	Megavardhini S pooja S Sri swetha S
Sprint 4	**GPS tracking**	USN-8	As a user, they can also help large hospitals and clinics manage their inventory more effectively	**5**	**Low**	Sri swetha S Megavardhini S Vasumathi S
	sensor	USN-9	As, a user they used for keeping the record in medicine details the reminding the schedule of medicine. We have used the IOT enabled Arduino device for Monitoring the system	**10**	High	Megavardhini S Vasumathi S Pooja S

6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Dura ti on	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	8Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	10	8Days	31 Oct 2022	05 Nov 2022	10	05 Nov 2022
Sprint-3	20	8Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	10	8Days	14 Nov 2022	19 Nov 2022	10	19 Nov 2022

Chapter - 7

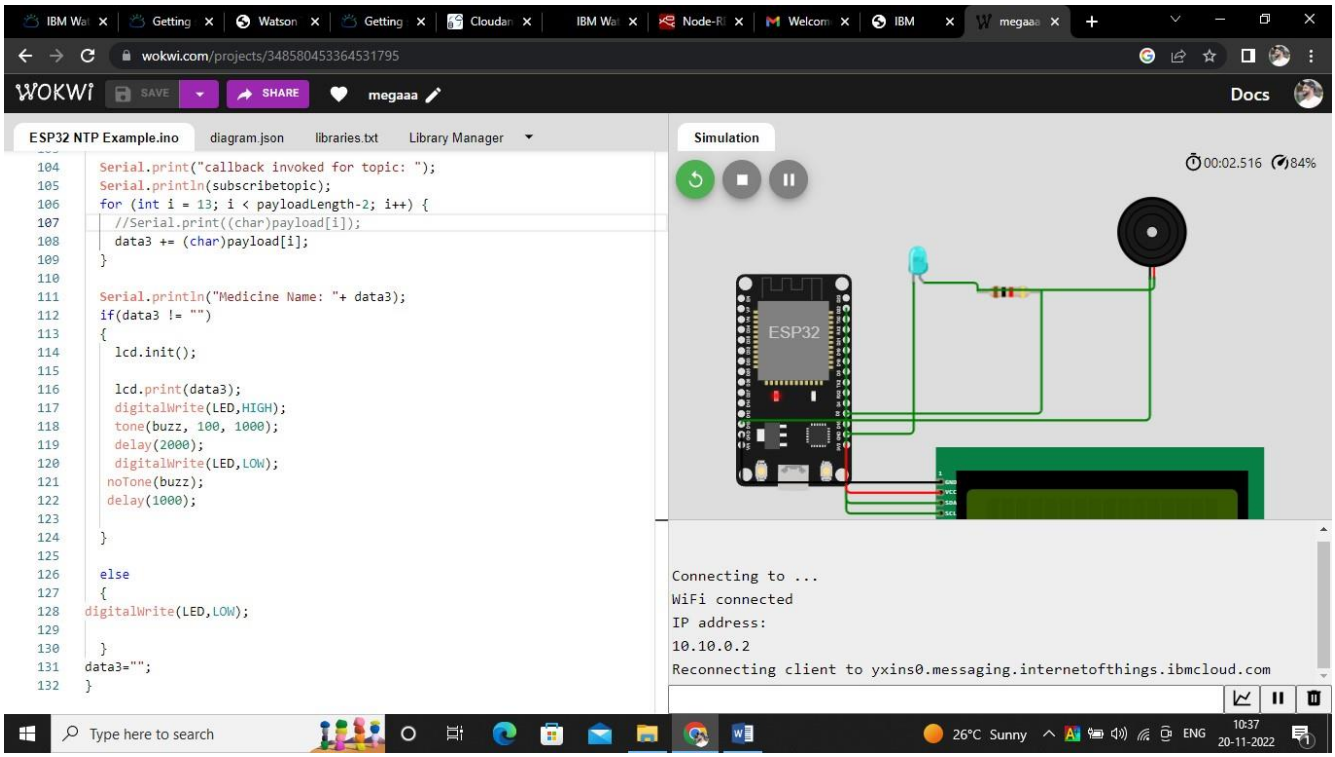
CODING

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

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


#define ORG "yxins0"//IBM ORGANITION ID
#define DEVICE_TYPE "b11m32deviceid"//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "123456"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "12345678"     //Token
String data3=""; int buzz= 13;


//-------- Customise the above values -------- char server[] = ORG
".messaging.internetofthings.ibmcloud.com";// Server Name char publishTopic[] =
"iot-2/evt/Data/fmt/json";// topic name and type of event perform and format in
which data to be send
char subscribetopic[] = "iot-2/cmd/command/fmt/String";// cmd  REPRESENT command type
AND COMMAND IS TEST OF FORMAT STRING char authMethod[] = "token";// authentication
method char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id LiquidCrystal_I2C
lcd(0x27,32,2);


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

```
Serial.begin(115200);
```

```
  dht.begin();
  pinMode(buzz, OUTPUT);
pinMode(LED,OUTPUT);
delay(10);   Serial.println();
wificonnect();
mqttconnect();
}  void loop()// Recursive
Function
{   if (!client.loop())
{     mqttconnect();
  }

}



/*.....................................retrieving to
Cloud.............................*/
 void PublishData(float temp, float humid) {
  mqttconnect();//function call for connecting to ibm
   } void mqttconnect() {
if (!client.connected()) {
    Serial.print("Reconnecting client to ");
Serial.println(server);     while
(!!!client.connect(clientId, authMethod, token)) {
Serial.print(".");       delay(500);
    }
initManagedDevice();
     Serial.println();
  } }
void wificonnect() //function definion for wificonnect {
  Serial.println();
  Serial.print("Connecting to ");


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

```
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}  void initManagedDevice()
{
  if (client.subscribe(subscribetopic)) {
Serial.println((subscribetopic));
    Serial.println("subscribe to cmd OK");
  } else {
    Serial.println("subscribe to cmd FAILED");
  }
}  void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength)
{


  Serial.print("callback invoked for topic: ");
Serial.println(subscribetopic);
  for (int i = 13; i < payloadLength-2; i++) {
//Serial.print((char)payload[i]);     data3 +=
(char)payload[i];
  }


  Serial.println("Medicine Name: "+ data3);
if(data3 != "")
  {
    lcd.init();
         lcd.print(data3);
digitalWrite(LED,HIGH);
tone(buzz, 100, 1000);
delay(2000);
digitalWrite(LED,LOW);
noTone(buzz);
delay(1000);


  }    else    {
digitalWrite(LED,LOW);
} data3="";
}
```

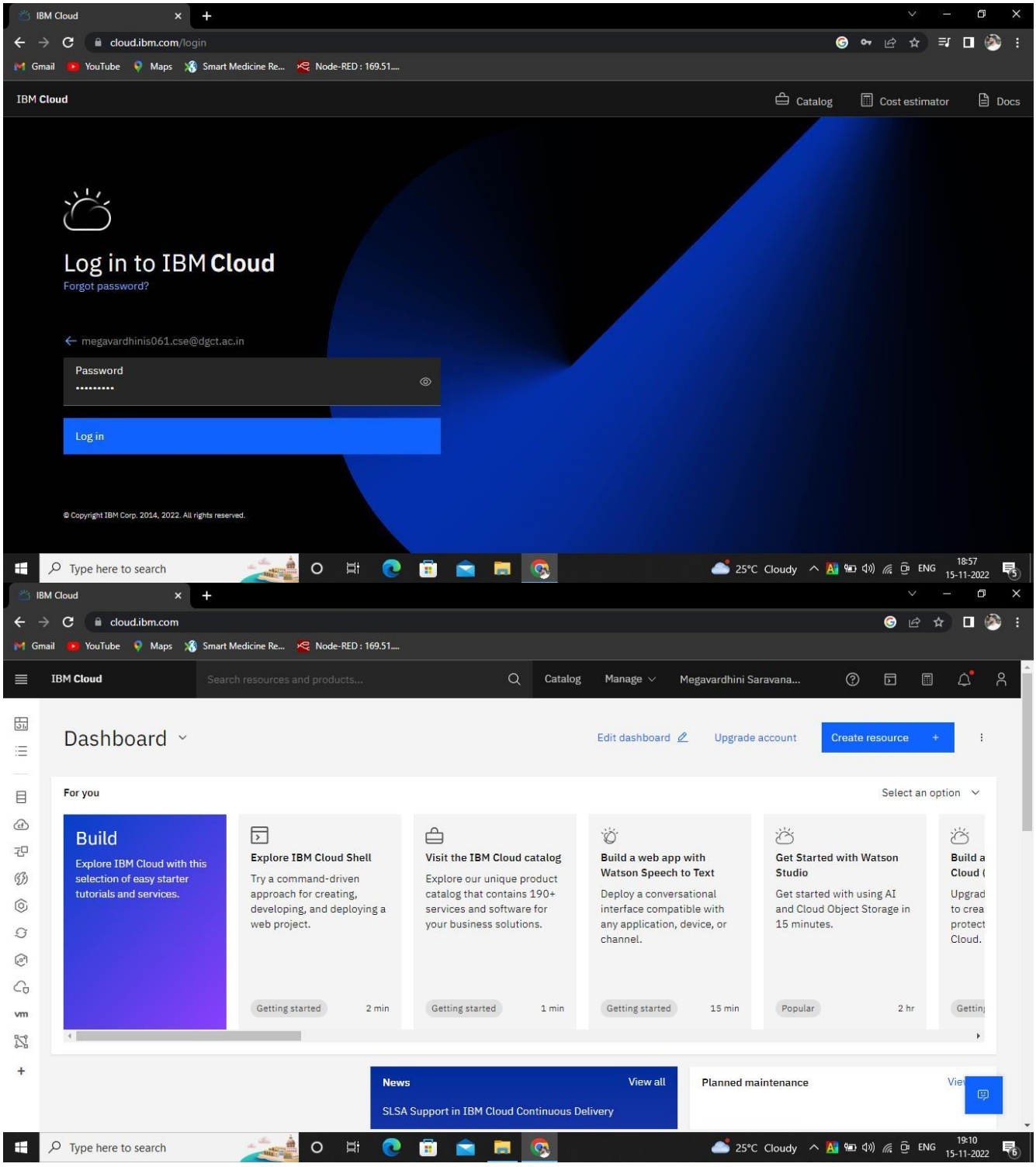



```
  Serial.print("callback invoked for topic: ");
  Serial.println(subscribetopic);
  for (int i = 13; i < payloadLength-2; i++) {
    //Serial.print((char)payload[i]);
    data3 += (char)payload[i];
  }

  Serial.println("Medicine Name: "+ data3);
  if(data3 != "")
  {
    lcd.init();

    lcd.print(data3);
    digitalWrite(LED,HIGH);
    tone(buzz, 100, 1000);
    delay(2000);
    digitalWrite(LED,LOW);
   noTone(buzz);
   delay(1000);


  }

  else
  {
digitalWrite(LED,LOW);

  }
data3="";
}
```

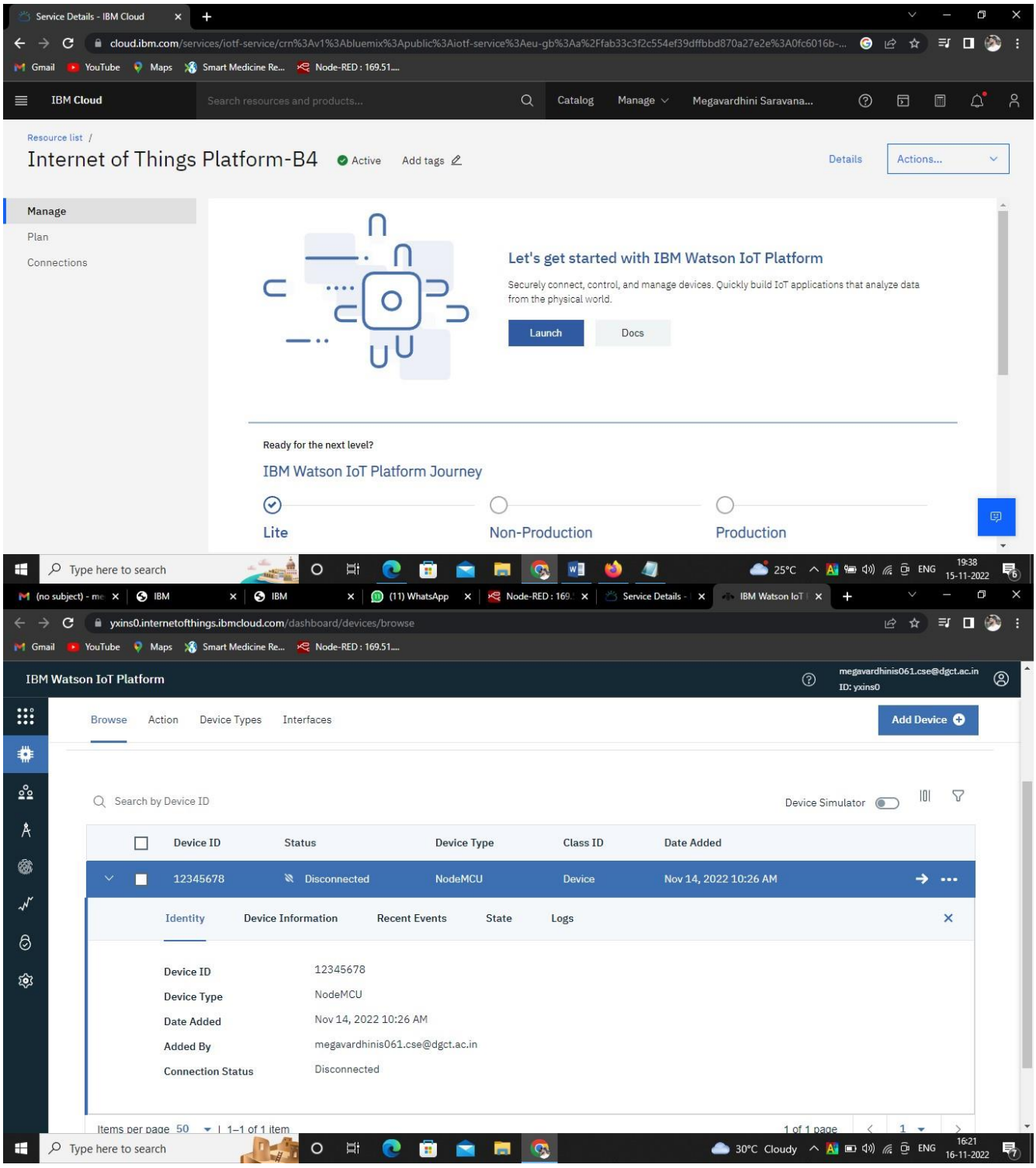
CHAPTER 8

8. IBM CLOUD AND WATSON

8.1 IBM CLOUD

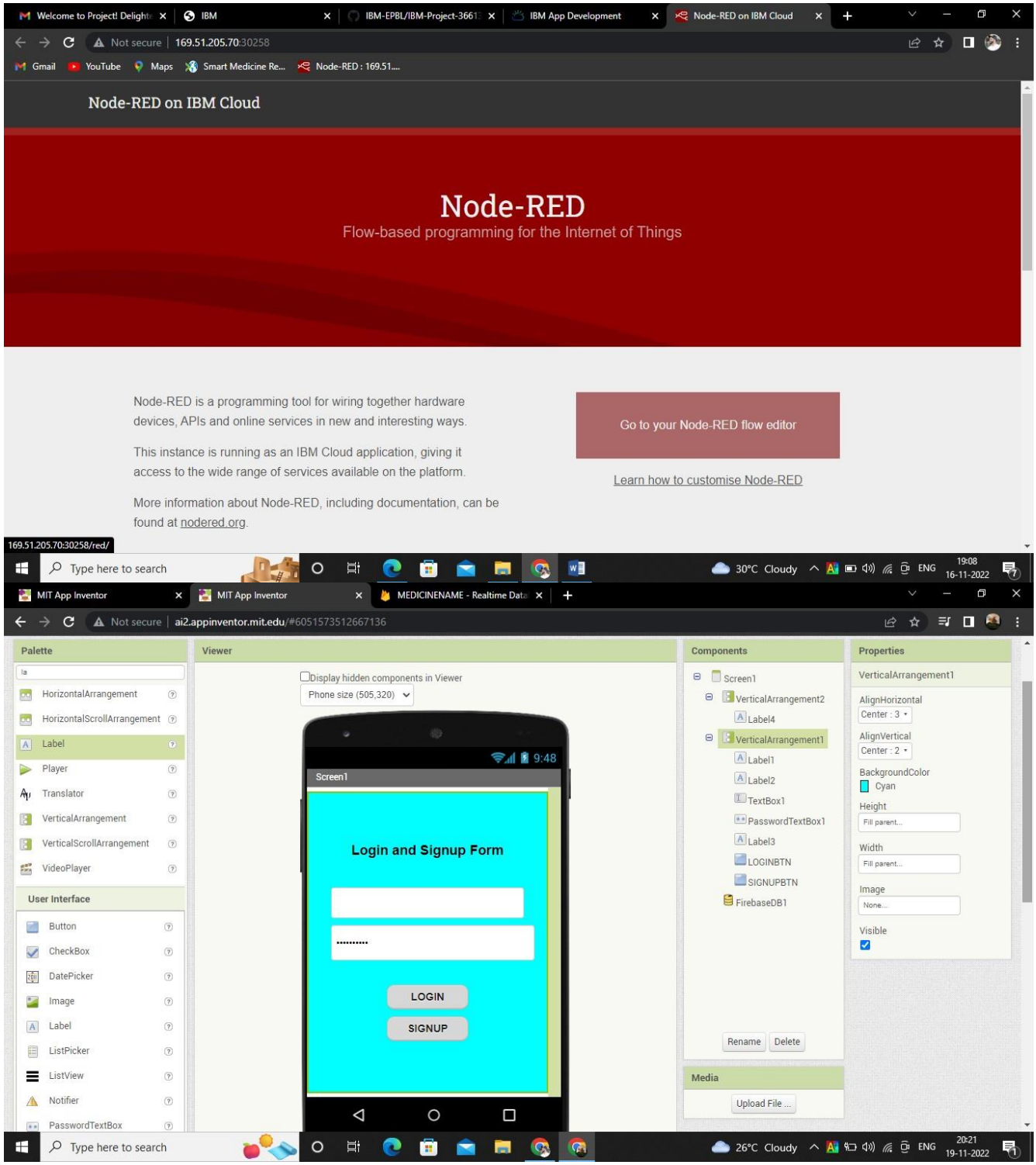


8.2 IBM WATSON

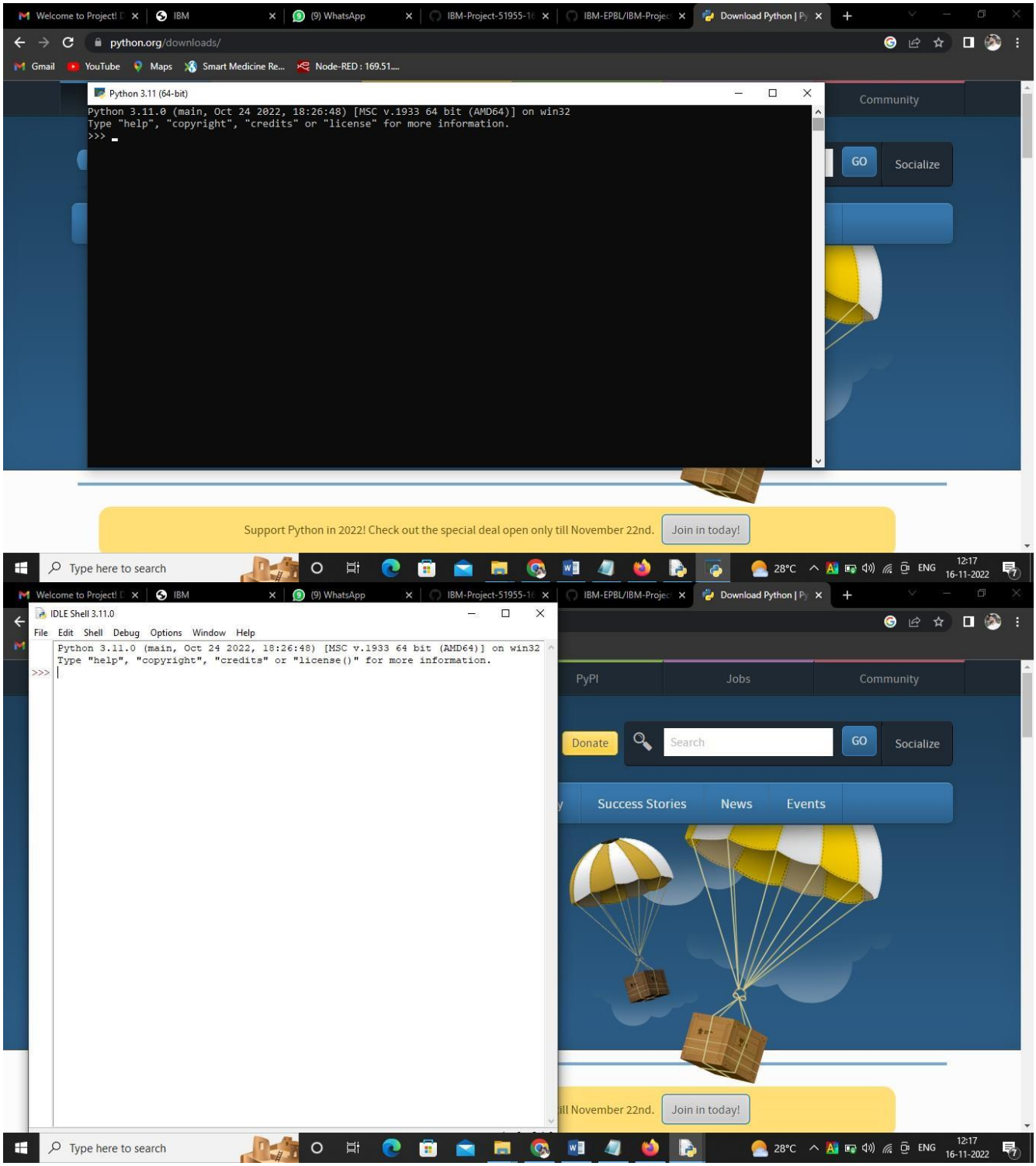


CHAPTER 9

9.1NODE RED AND MIT APP INVENTOR



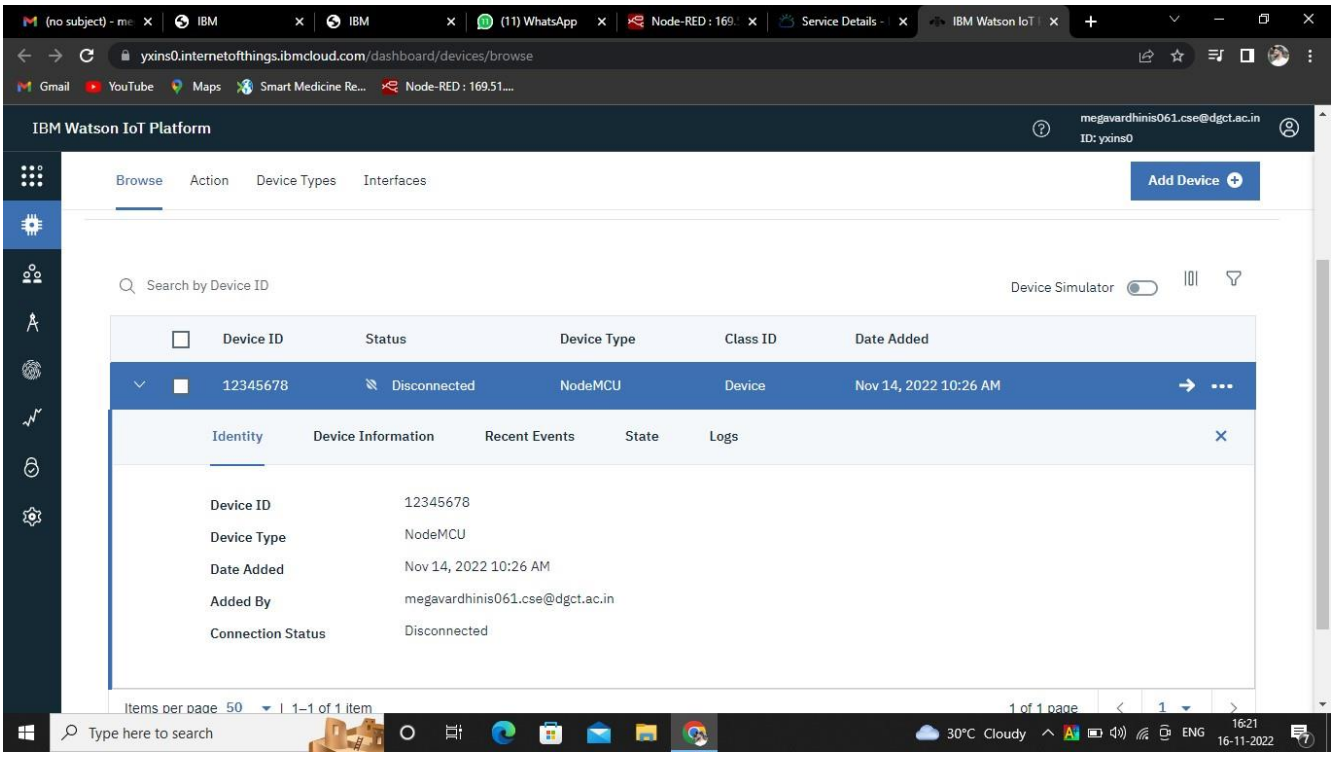
9.2 PYTHON


Welcome to Project!
IBM
(9) WhatsApp
IBM-Project-51955-16
IBM-EPBL/IBM-Project
Download Python | Py
python.org/downloads/
Gmail
YouTube
Maps
Smart Medicine Re...
Node-RED : 169.51....
Python 3.11 (64-bit)
Python 3.11.0 (main, Oct 24 2022, 18:26:48) [MSC v.1933 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>>
Community
GO
Socialize
Support Python in 2022! Check out the special deal open only till November 22nd.
Join in today!
Type here to search
28°C
ENG
12:17
16-11-2022
IDLE Shell 3.11.0
File Edit Shell Debug Options Window Help
Python 3.11.0 (main, Oct 24 2022, 18:26:48) [MSC v.1933 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
PyPI
Jobs
Community
Donate
Search
GO
Socialize
Success Stories
News
Events
Join in today!

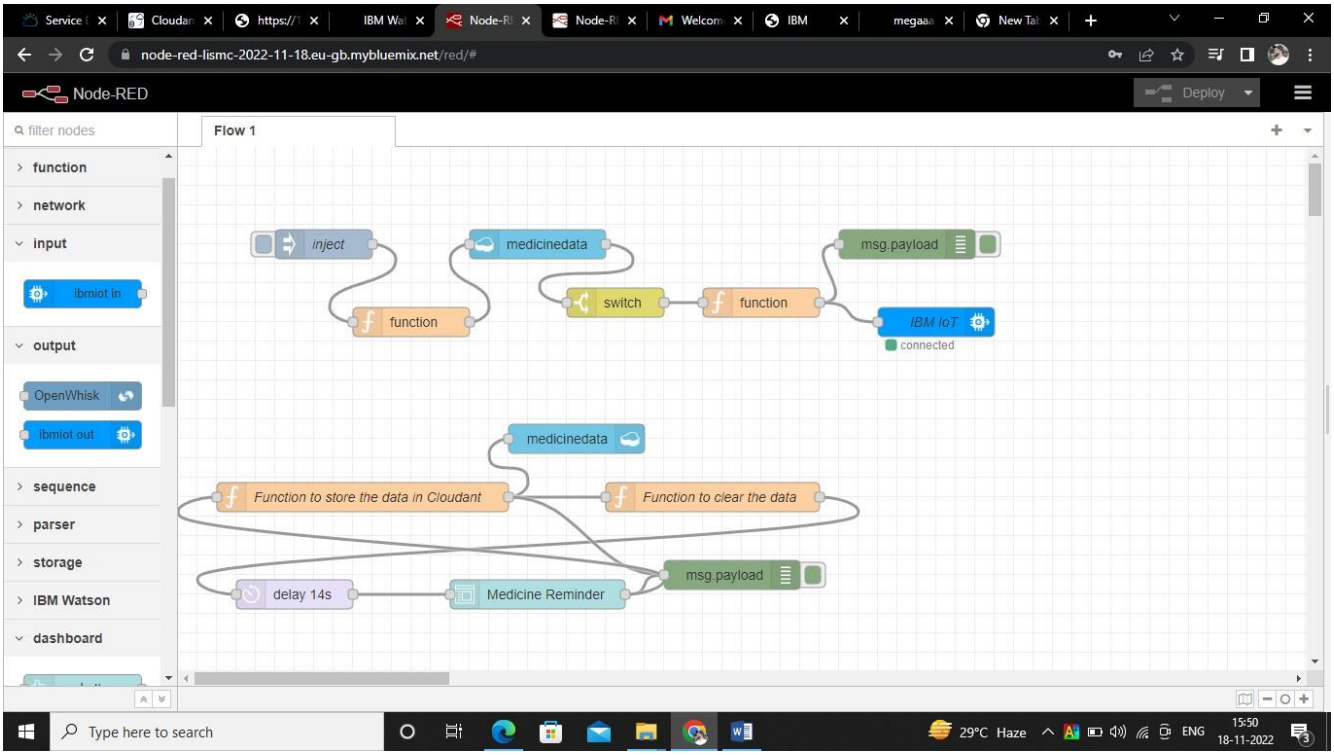
CHAPTER 10

TESTING

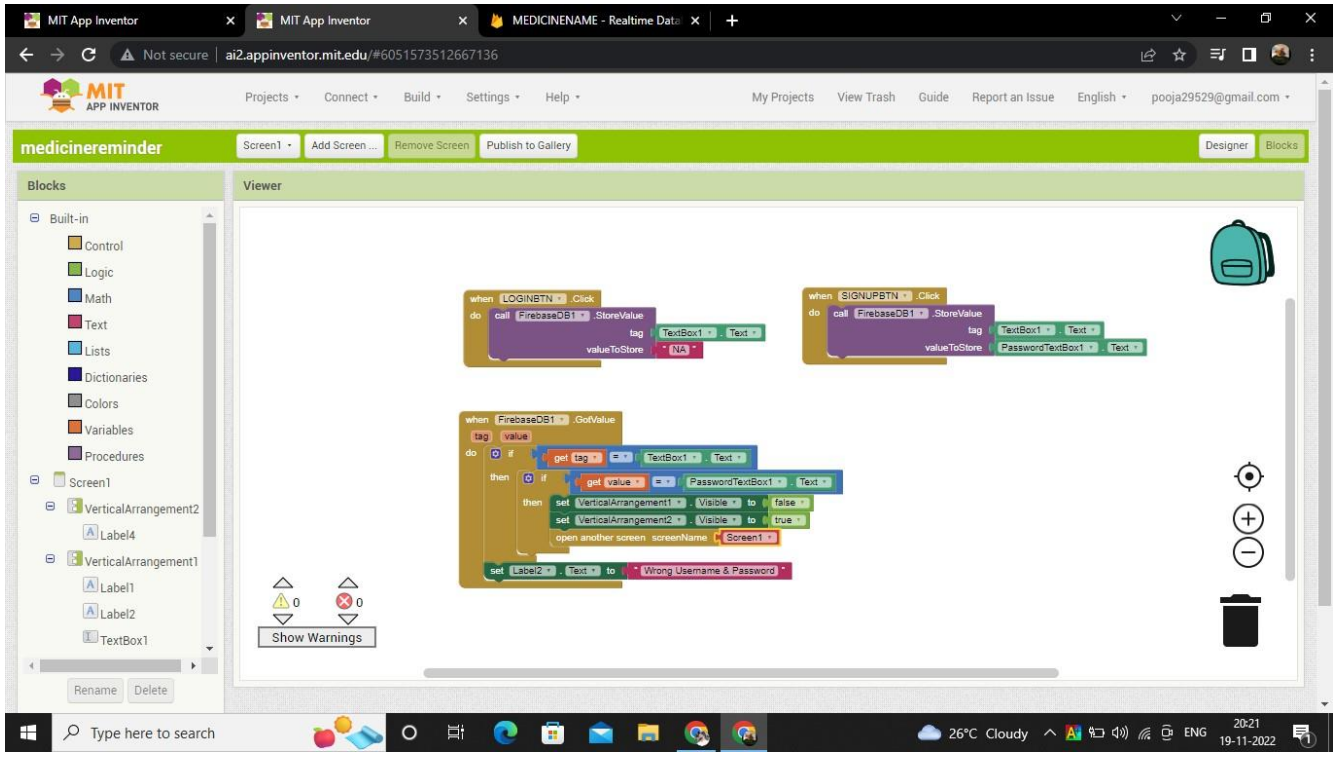
10.1 IBM WATSON



10.2 NODE RED



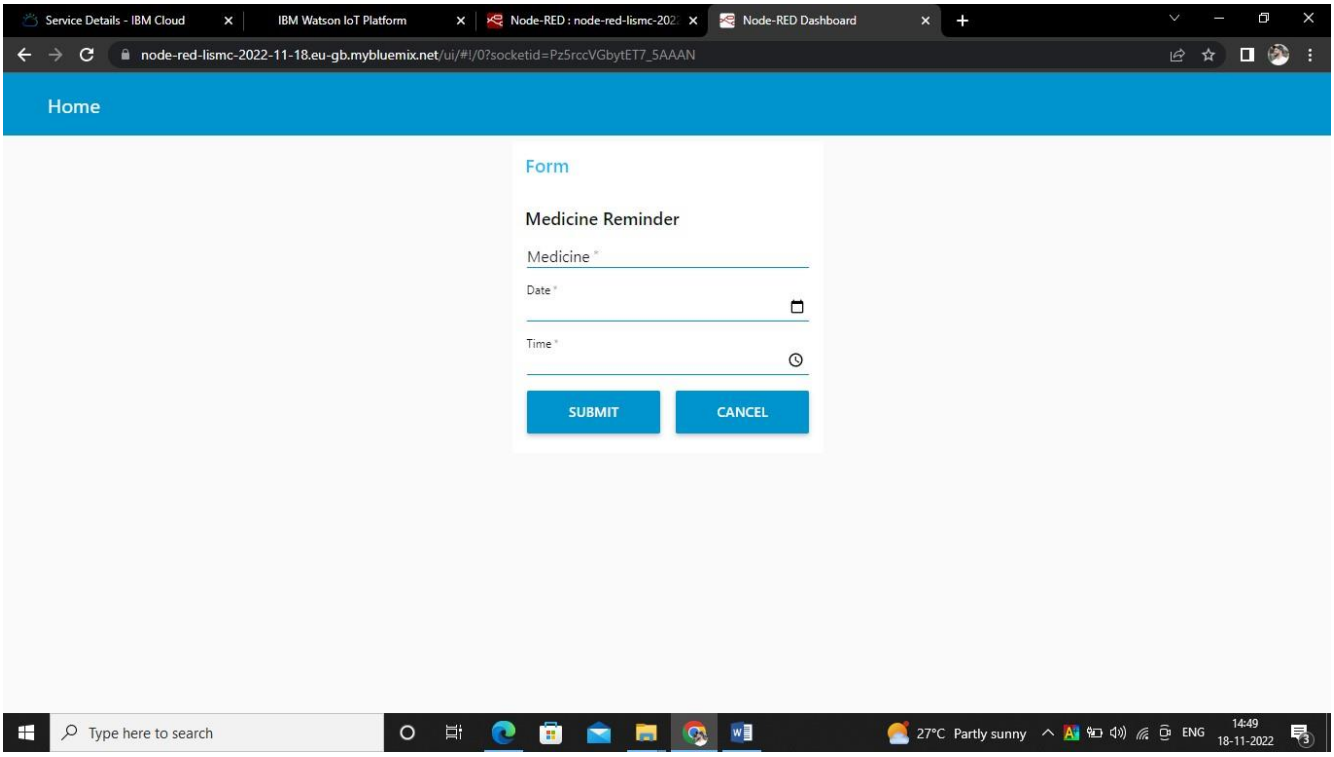
10.3 MIT APP


MIT App Inventor
MIT App Inventor
MEDICINENAME - Realtime Data
Not secure
ai2.appinventor.mit.edu/#6051573512667136
MIT APP INVENTOR
Projects
Connect
Build
Settings
Help
My Projects
View Trash
Guide
Report an Issue
English
pooja29529@gmail.com
medicinereminder
Screen1
Add Screen ...
Remove Screen
Publish to Gallery
Designer
Blocks
Blocks
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen1
VerticalArrangement2
Label4
VerticalArrangement1
Label1
Label2
TextBox1
Rename
Delete
Viewer
when LOGINBTN .Click
do call FirebaseDB1 .StoreValue
tag TextBox1 . Text
valueToStore NA
when SIGNUPBTN .Click
do call FirebaseDB1 .StoreValue
tag TextBox1 . Text
valueToStore PasswordTextBox1 . Text
when FirebaseDB1 .GotValue
tag value
do if get tag = TextBox1 . Text
then if get value = PasswordTextBox1 . Text
then set VerticalArrangement1 . Visible to false
set VerticalArrangement2 . Visible to true
open another screen screenName Screen1
set Label2 . Text to Wrong Username & Password
0
0
Show Warnings
Type here to search
26°C Cloudy
ENG
20:21
19-11-2022

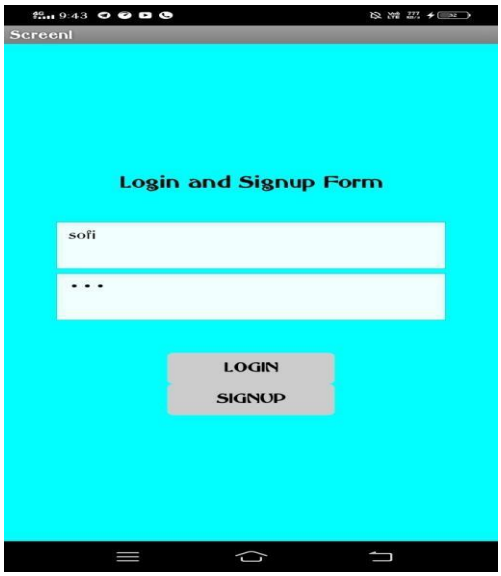
Chapter – 11

OUTCOME

11.1 NODE RED



11.2 MIT APP



10:46

HOMESCREEN

MEDICINE REMINDER SYSTEM

SET ALARM

MED SHOP

MED CHAT

EMERGENCY

10:47

Screen2

MEDICINE ALARM

ENTER YOUR MEDICINE DETAILS:

MEDICINE NAME:

MEDICINE DOSAGE: ENTER MEDICINE DOSA

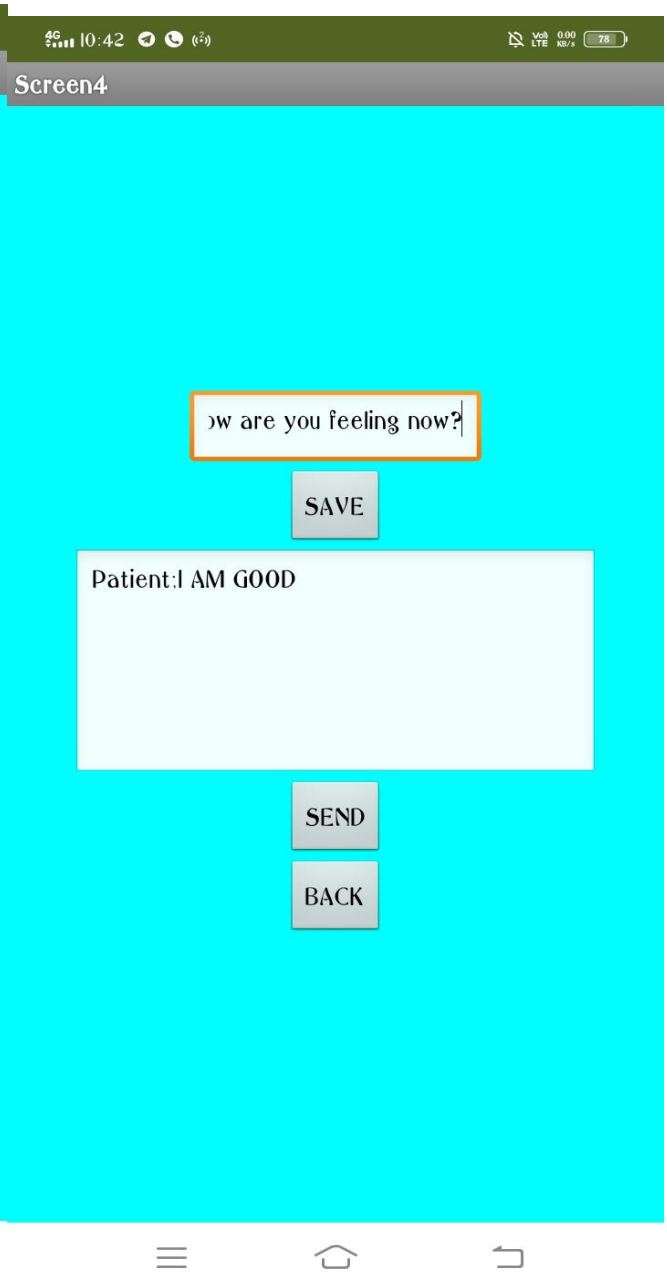
SELECT TIME: TIME

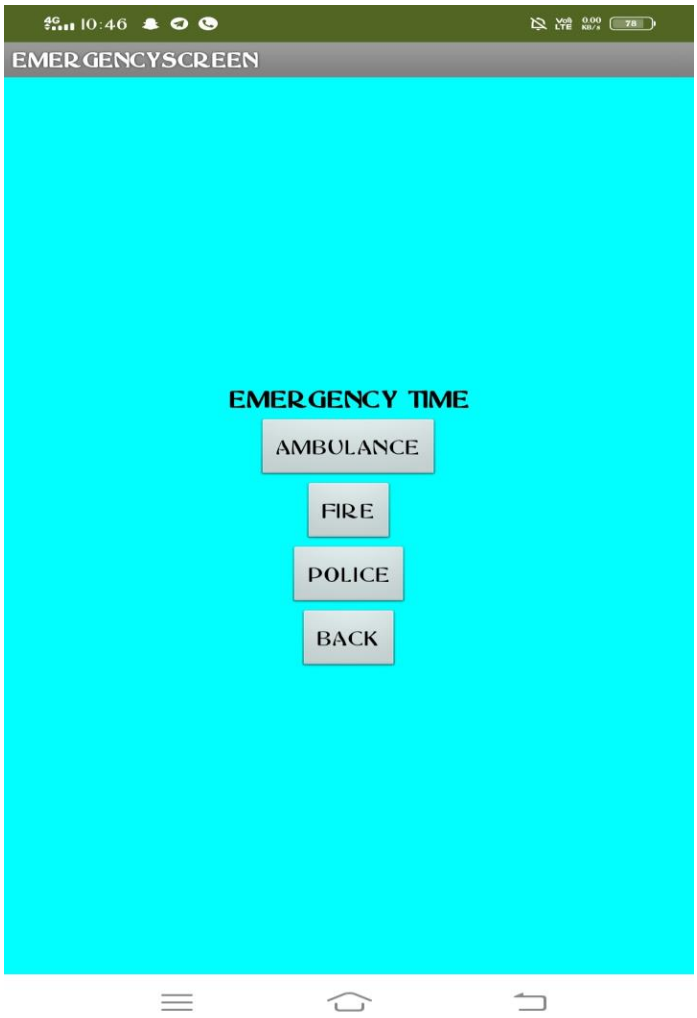
SELECT DATE: DATE

TICK THE CHECKBOX WHEN YOU TAKE THE MEDICINE

BACK


10:47
Screen3
MEDICINE STORE
APOLLO PHARMACY
NETMEDS
PHARMEASY
MEDPLUS
BACK


10:42
Screen4
ow are you feeling now?
SAVE
Patient:I AM GOOD
SEND
BACK


10:46
EMERGENCYSCREEN
EMERGENCY TIME
AMBULANCE
FIRE
POLICE
BACK

CHAPTER 12
ADVANTAGES & DISADVANTAGES

12.1 ADVANTAGES

Real-time remote monitoring via connected IoT devices and smart alerts can diagnose illnesses, treat diseases and save lives in case of a medical emergency.

Smart sensors analyze health conditions, lifestyle choices and the environment and recommend preventative measures, which will reduce the occurrence of diseases and acute states.

IoT reduces costly visits to doctors and hospital admissions and makes testing more affordable.

Accessibility of electronic medical records allow patients to receive quality care and help healthcare providers make the right medical decisions and prevent complications.

IoT devices help track the administration of drugs and the response to the treatment and reduce medical error.

Using IoT devices, healthcare authorities can get valuable information about equipment and staff

12.2 Disadvantages:

Security and privacy: Security and privacy remain a major concern deterring users from using IoT technology for medical purposes, as health monitoring solution have the potential to be breached or hacked.

The leak of sensitive information about the patient's health and location and meddling with sensor data can have grave consequences, which would counter the benefits of IoT.

Risk of failure: Failure or bugs in the hardware or even power failure can impact the performance of sensors and connected equipment placing healthcare operations at risk. In addition, skipping a scheduled software update may be even more hazardous than skipping doctor'or checkup.

Integration: There's no consensus regarding IoT protocols and standards, so devices produced by different manufacturers may not work well together. The lack of uniformity prevents full-scale integration of IoT, therefore limiting its potential effectiveness.

Cost: While IoT promises to reduce the cost of healthcare in the longterm, the cost of its implementation in hospitals and staff training is quite high.

CHAPTER 13

CONCLUSION

It is an advanced digital era, we can also opt for expert agencies without thinking much about the distance. For example, suppose we stay in the European region. In that case, we can look for a healthcare app development company in the USA or a healthcare mobile app development firm in other states. IoT is already practicing most of these technologies to as sist healthcare in developing, and this development will proceed. Promptly than later, healthcare and the Internet of Things will become intertwined, ultimately modifying how we approach our healthcare.

CHAPTER 14
FUTURE SCOPE

IoT has a lot of potentials and it's not only in healthcare. In future challenges of IoT in healthcare, many companies are working on new ways to solve the challenges with the help of this technology to help our medical world. It can reach every patient from all over the world and connect doctors with patients. There is no denying that IoT has already made a huge impact and is only set to grow further. It is a matter of time before the future use of IoT in healthcare medical industry will be run mostly by IoT technology and will be treating patients in less time and low cost of treatment.