

# **Department of Information Technology**

## **NBA Accredited**

A.P. Shah Institute of Technology

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UNIVERSITY OF MUMBAI

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A Project Report on  
**IoT based Healthcare kit with Chatbot**

Submitted in partial fulfilment of the degree of  
Bachelor of Engineering(Sem-8)

in  
**INFORMATION TECHNOLOGY**

By

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# 1. Project Conception and Initiation

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# 1.1 Abstract

- The Healthcare of a country plays a major role in defining a country's development.
- It is the expenditure, quality, and accessibility of health services that govern the quality of healthcare.
- A significant issue in rural India is the 1:10,000 ratio of doctor to patient, which is now resolved by this kit because doctors all over India can now access the data on their timeline.
- With this in mind, we aim to develop an IoT based healthcare kit with chatbot that provide primary patient monitoring and care assistance to strengthen our country's healthcare system from rural to urban sectors.
- A web-based application is also provided which is integrated with Chatbot for our system to broaden usability.

# 1.2 Objectives

- Develop an absolute, portable and cheap system that will be 24/7 available.
- Lessening the communication gap by providing quick access to doctors via web-based portal.
- Aid the disabled and old people who cannot come to hospitals independently for their regular checkups.
- Enable constant monitoring of a patient by providing real time analysis of health parameters.
- Storing the Electronic Health Record and sensor's data on Cloud to ease accessibility.
- Ease the usability by developing a Web based application.
- Integration of chat bot that would assist medical queries, symptom check and provide referral for major health issues that would decrease time and expenditure of patients.

# 1.3 Literature Review

Title	Author	Year of Publication	Findings	Drawback	Our Project
IoT Based Health Monitoring System	Tamilselvi V, Sribalaji S, Vigneshwaran P, Vinu P, J.GeethaRamani	2020	It offers an accelerometer sensor displays the body movments of the coma patients. All the information is collected via the internet and their devices are all connected to cloud services.	It focuses on coma patients and the sensors used are not of much use for basic health check up and there is no web-portal.	Focuses on over- all health parameters with easy usuablity by providing a web-based portal
IoT based Health Care Monitoring Kit	Anand D. Acharya, Shital N. Patil	2020	The developed system consists of basic health parameters like ECG and temperature. This data is collected from the following sensors and sent to raspberry pi.	The project is effective but there is no data visualization interface for the kit.	Dashboard and web-based portal has been developed for visualization with health bot feature
IoT based smart healthcare kit	Punit Gupta, Jasmeet Chhabra, Pulkit Kumar Dhir, Deepika Agrawal	2016	The proposed model collects data from the sensors like pulse rate, blood pressure and ECG . The server uploads the database with current medical information.	After a certain amount of time, database contraint will be the major issue	Entire database is connected to cloud services
Smart Health Monitoring System based on IoT and Cloud Computing	Ali I. Siam, Atef Elsayed Abouelaz, Nirmeen A. El-Bahnasawy, Ghada El Banby	2019	This paper discusses the processing and encryption tasks, as well as enabling WiFi connections to the cloud, are all handled by a Node MCU microcontroller.	There is little to no importance given to GUI which decrease the overall efficiency	Web - based portal is developed for better approach with chat bot feature.

# 1.4 Problem Definition

- Many rural areas don't have enough physicians, hospitals and other health care resources to provide quality care for the whole population.
- Long waiting times, long duration between visits and a wide range of other challenges can prevent health care professional from providing the best care possible.
- The websites available are mostly comprised of a particular hospital which reduces the versatility and also doctors don't have enough time to give to online as well as incoming patients.
- In addition to this, there are applications which are just limited to making appointments with doctors and very minimal interaction related to disease condition of the patients.
- This project aims at providing an IoT based remote Health care kit and AI Chatbot which provides healthcare tips to patients, and effectively, reducing the cost of customer service and providing a vital communication link between doctors and patients.

# 1.5 Scope

- A valuable asset to Healthcare sector
- Remote Patient Monitoring
- Reduced Healthcare cost
- Care for elderly
- Health Chatbot facility
- Quick access to doctors
- Reduce the pollution by making everything digitally available



# 1.6 Technology stack

## Hardware Components:

Arduino UNO

Oximeter MAX 30100

Temperature Sensor TMP 36

Pressure Sensor BMP 180

Capacitor

Resistor

Touch Display – Nextion 2.4”

## Software's Used:

HTML5

CSS

Bootstrap

JQuery

MySQL

Xampp

Node-Red

AWS

Nextion

Tinkercad

# 1.7 Benefits for environment & Society

- Useful in the healthcare sector, mainly in rural areas, where there are limited facilities of resources and hospitals.
- Extremely efficient for disabled and old-age people who cannot independently come for regular checkups
- With such feasibility of web portal and chatbot, it will help decrease time and expenditure of patients.
- Casing used for the development of a healthcare kit will be made from a biodegradable material.
- As this kit doesn't require any paperwork, we will be saving a lot of wood and electricity consumption. No waste will be generated. Therefore, it is not going to contribute to any sort of land pollution.

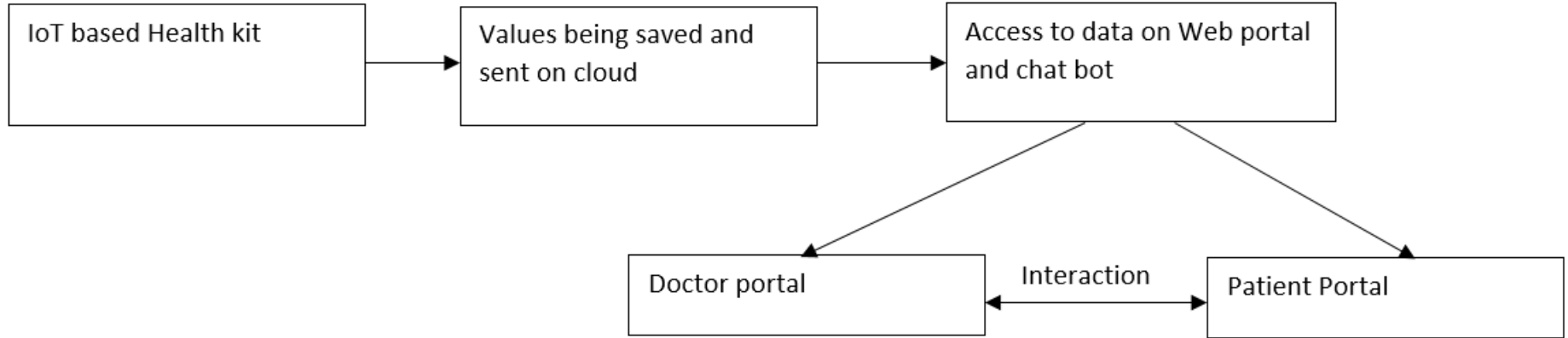
## 2. Project Design

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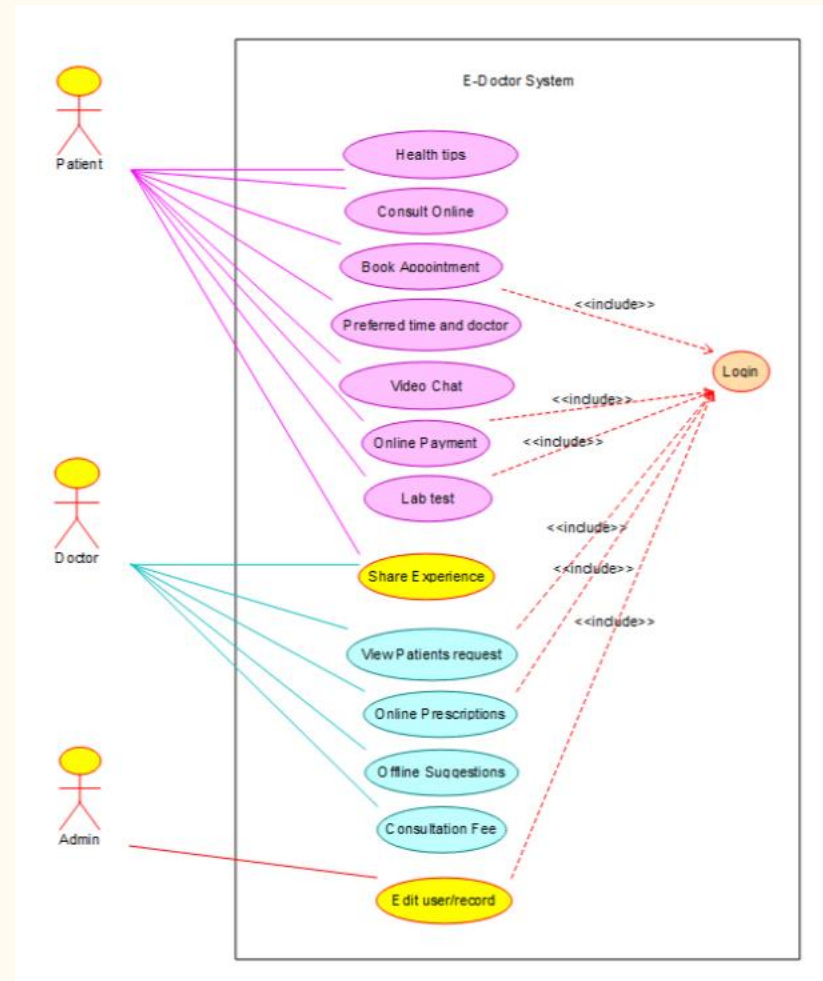
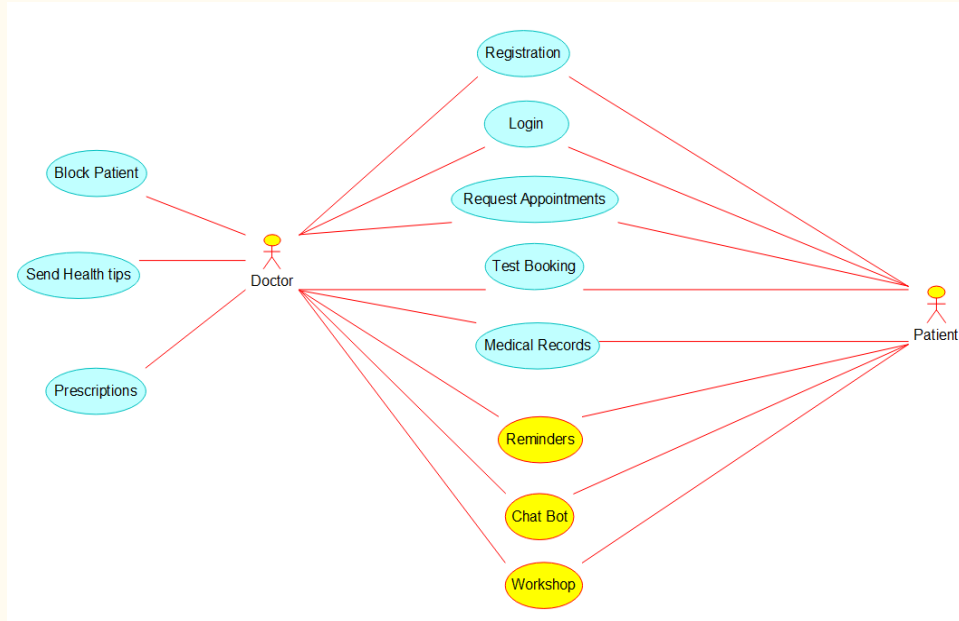
## 2.1 Proposed System

- IoT based Health care kit consisting of:
  - Blood pressure sensor BMP 180
  - Temperature sensor TMP 36
  - Pulse Oximeter MAX30100
- Kit is connected to Node-Red for database management.
- Website based application for better understanding of data and easy usability.
- Integration of Chatbot in the application programmed with Rasa.

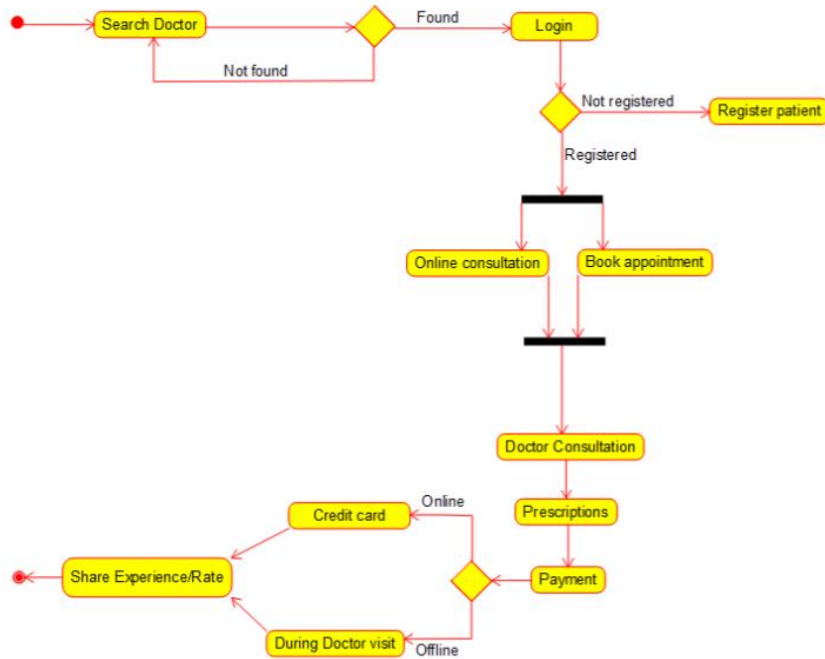
## 2.2 Design(Flow Of Modules)



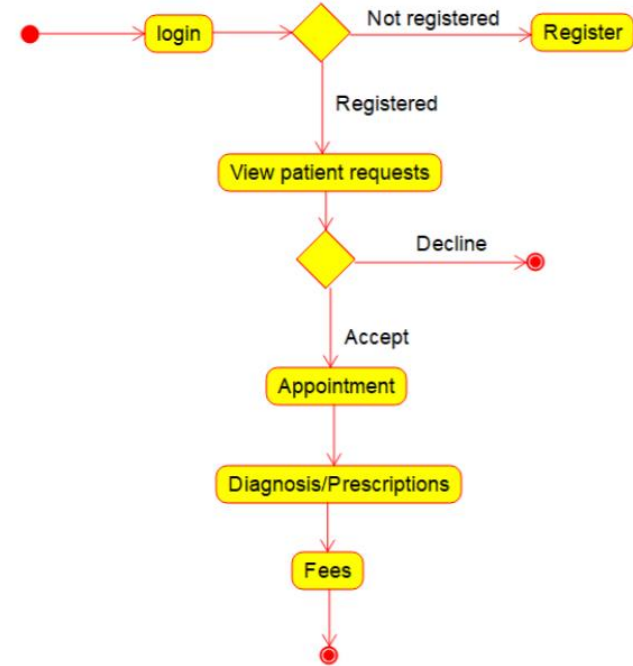
## 2.3 Description Of Use Case



## 2.4 Activity diagram

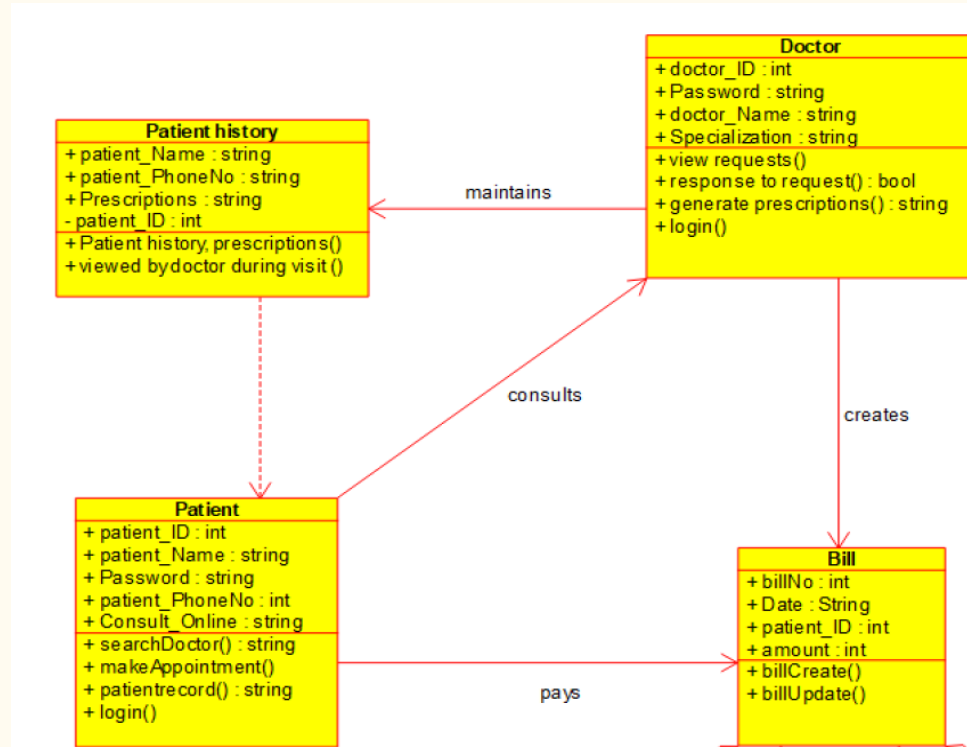


Activity diagram of a patient consulting a doctor in our system



Activity diagram of doctor viewing the request in our system

## 2.5 Class Diagram

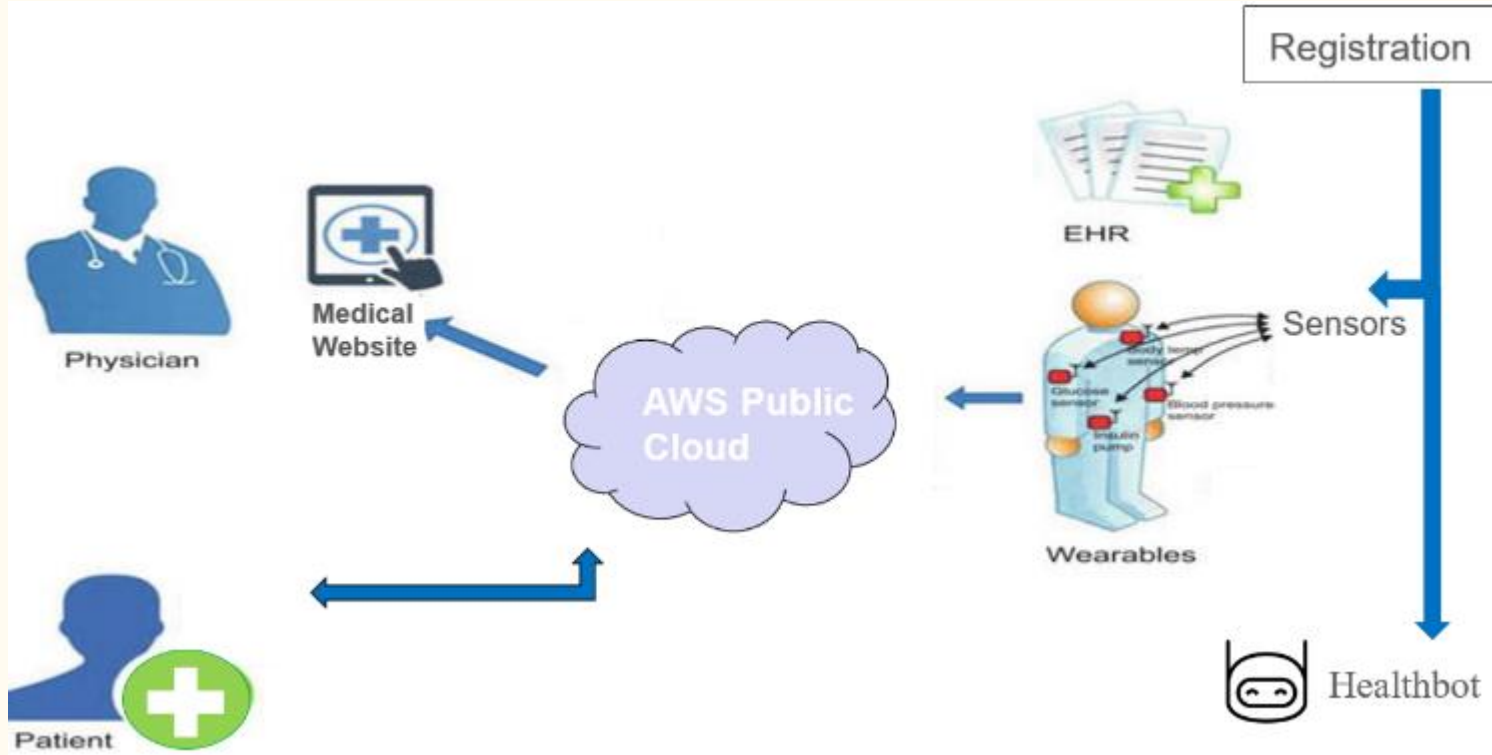




# 3. Implementation

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# 3.1 Implementation



## 3.2 Implementation – Health kit GUI

### Registration Form

First Name	Middle Name	Last Name
Mobile Number	Date of Birth	

NEXT

### How to use the kit

Each kit consists of oximeter, blood pressure, temperature and ECG sensor.

For pulse oximeter sensor, tie the band around the fingertip with sensor facing inwards. A beep sound will come when the sensor will take the value of heartbeat in BPM and oxygen in percentage.

For temperature sensor, hold the sensor in between the thumb and index finger until a beep sound comes.

For blood pressure, wrap the band around the wrist. Click on start button and wait until the beep sound comes.

BACK NEXT

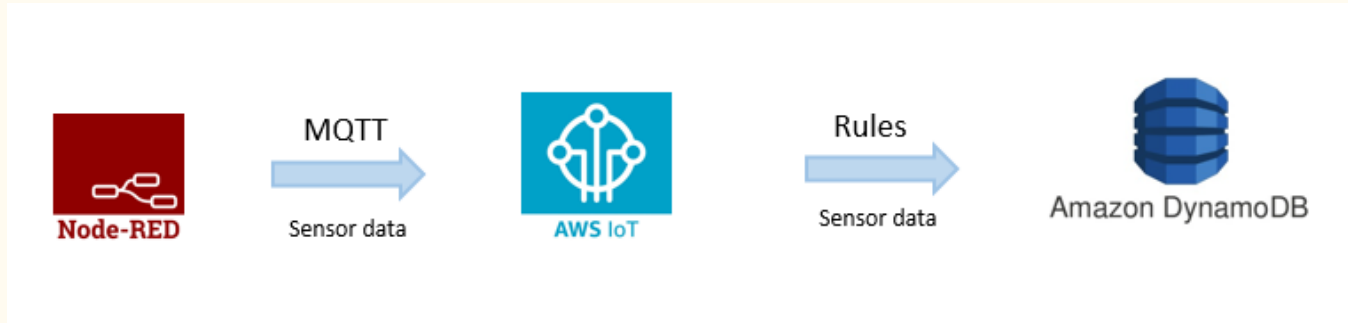
### Results

Heart Rate	80
Blood Pressure	92
Oxygen	87
Temperature	38

BACK SUBMIT

The data has been successfully sent!!!

## 3.4 Implementation – Sensor to Cloud flow diagram



**Fig. Flow diagram of storing sensor data**



**Fig. Flow diagram of retrieving sensor data**

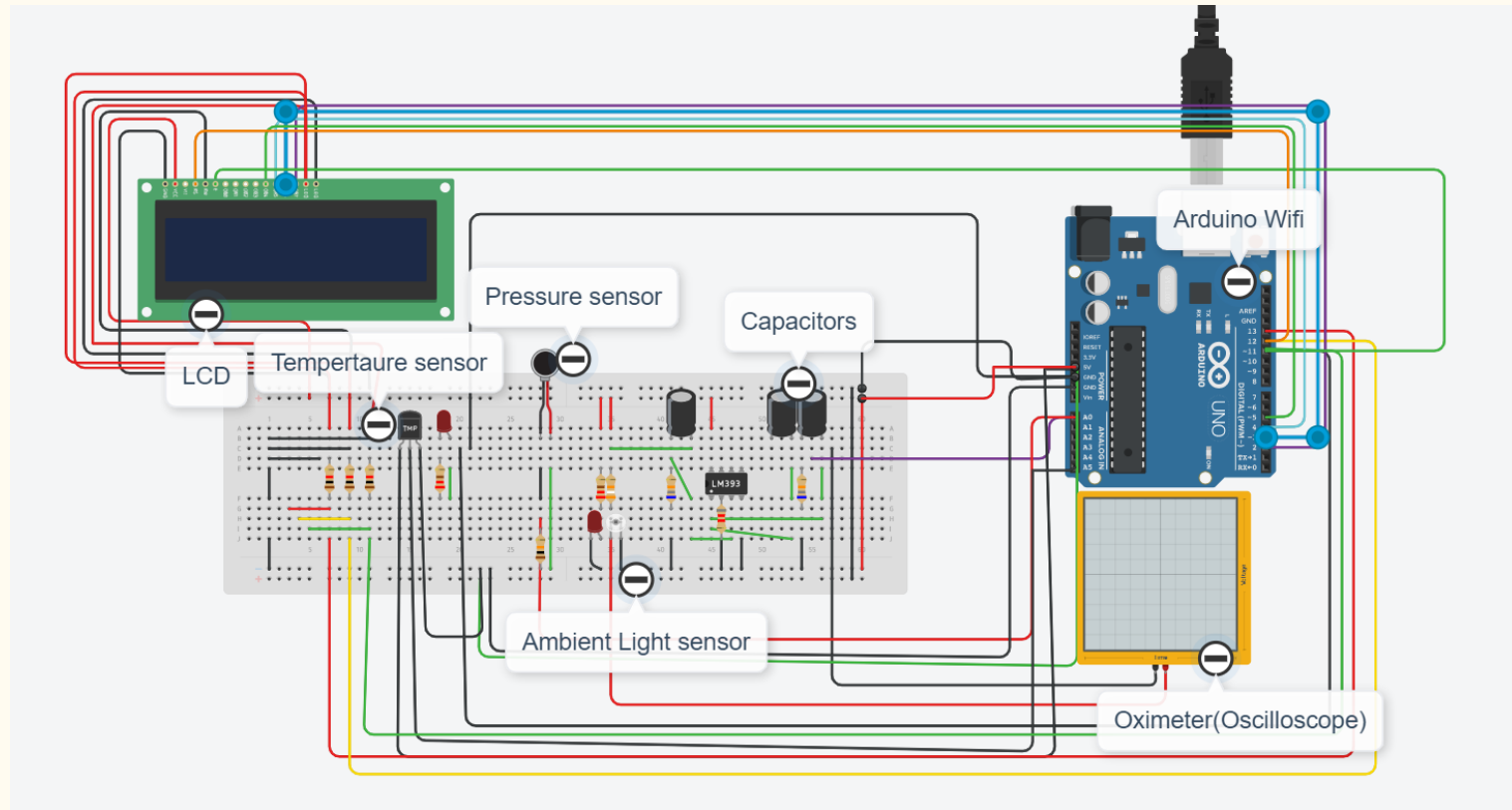
## 3.5 Implementation – Rasa Chatbot on Terminal

```
Your input -> hi
Hi! How may I help you? Are you facing any of these problems: Headache | Stomache | Flu | Vision
Your input -> stomache
Since when are you experiencing the pain? less than 24 hours | more than 24 hours
Your input -> less
Are you facing any of the following issues: Bloating, Constipation, Gas? Yes | No
Your input -> no
Following are the remedies for some other causes of Stomach-ache :
Lower Abdomen Pain - 1. Use a heating bag, 2.Reduce your intake of coffee, tea and alcohol as these can
make the pain worse. 3.Get plenty of rest.
Vomiting - 1.Eat light, bland foods 2.Avoid fried, greasy, or sweet foods. 3.Eat slowly and eat smaller,
more frequent meals.
Loose Motions - 1.Drink ginger juice, 2. Drink lemon and salt water 3. Eat pomegranate
I hope that this helps you.
If you wish to continue please select which problem: Headache | Stomach-ache | Flu | Vision.
Else you can exit
Your input -> .
```

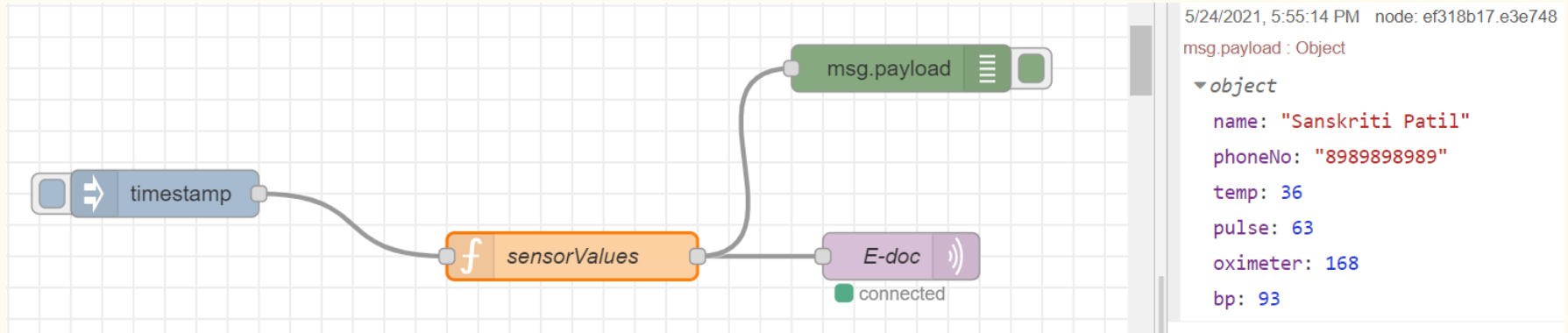
# 4. Testing

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## 4.1 Testing – Circuit Diagram



# 4.1 Testing – Node Red





## 4.2 Testing

### Subscriptions

edoc  

edoc

▼ edoc

May 24, 2021, 17:55:15 (UTC+0530)

```
{
  "name": "Sanskriti Patil",
  "phoneNo": "8989898989",
  "temp": 36,
  "pulse": 63,
  "oximeter": 168,
  "bp": 93
}
```


Pause

Clear

Export

Edit

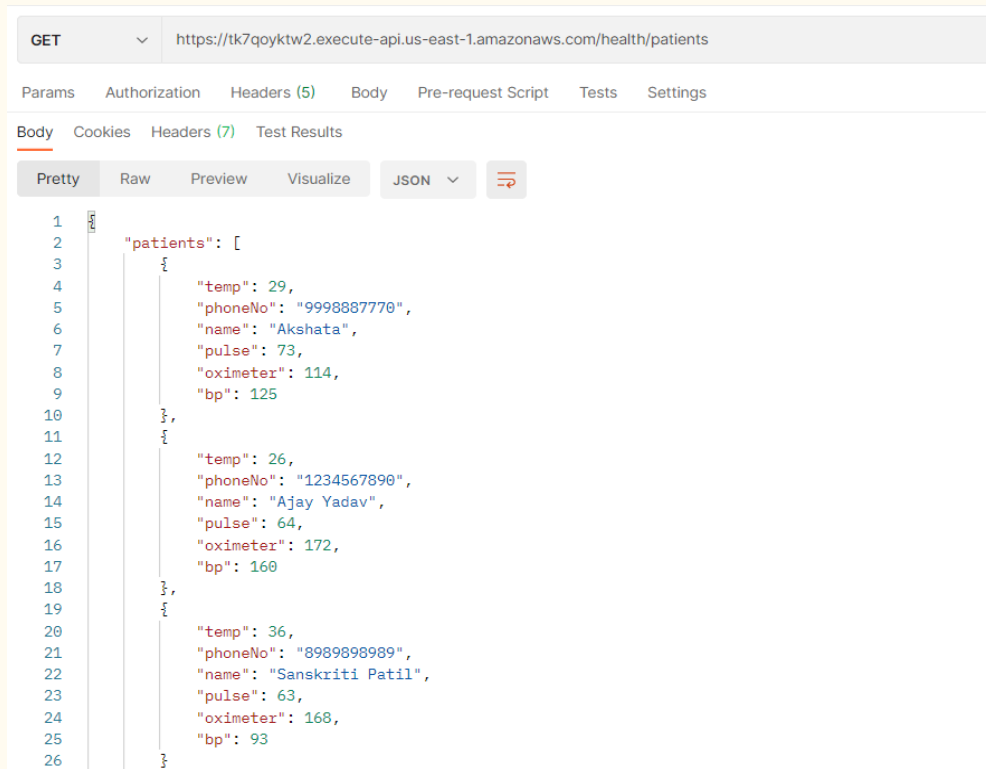
## 4.4 Testing – Database Management



The screenshot displays a database management application. On the left, a tree view shows the database structure under 'doctor\_appointment', including 'New', 'admin\_table', 'appointment\_table', 'doctor\_schedule\_table', 'doctor\_table' (highlighted), and 'patient\_table'. On the right, a table view shows the data for 'doctor\_table' with columns: 'doctor\_id', 'doctor\_email\_address', 'doctor\_password', 'doctor\_name', and 'doctor\_profile\_image'. The table contains four rows of data, each with a checkbox, 'Edit', 'Copy', and 'Delete' icons, and a dropdown menu labeled '+ Options'.

				doctor_id	doctor_email_address	doctor_password	doctor_name	doctor_profile_image
<input type="checkbox"/>	Edit	Copy	Delete	7	shreya@gmail.com	123456	Dr. Shreya Nair	../images/2009680618.jpg
<input type="checkbox"/>	Edit	Copy	Delete	8	ayushi@gmail.com	123456	Dr. Ayushi Singh	../images/1404889906.jpg
<input type="checkbox"/>	Edit	Copy	Delete	9	shweta@gmail.com	123456	Dr. Shweta Chaudhari	../images/1227106223.jpg
<input type="checkbox"/>	Edit	Copy	Delete	10	harshit@gmail.com	123456	Dr. Harshit	../images/656853781.jpg

## 4.5 Testing – API testing



```
GET https://tk7qoyktw2.execute-api.us-east-1.amazonaws.com/health/patients

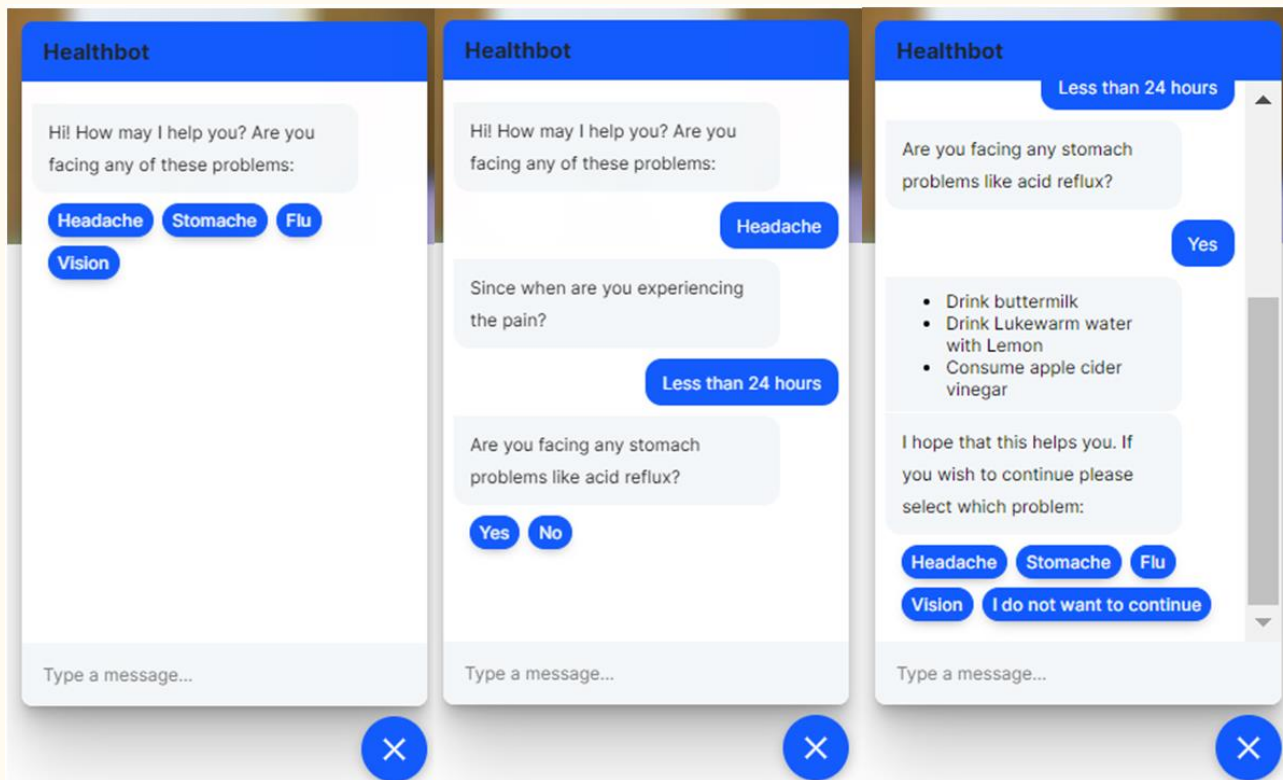
Params  Authorization  Headers (5)  Body  Pre-request Script  Tests  Settings

Body  Cookies  Headers (7)  Test Results

Pretty  Raw  Preview  Visualize  JSON  [icon]

1  [
2    "patients": [
3      {
4        "temp": 29,
5        "phoneNo": "9998887770",
6        "name": "Akshata",
7        "pulse": 73,
8        "oximeter": 114,
9        "bp": 125
10     },
11     {
12       "temp": 26,
13       "phoneNo": "1234567890",
14       "name": "Ajay Yadav",
15       "pulse": 64,
16       "oximeter": 172,
17       "bp": 160
18     },
19     {
20       "temp": 36,
21       "phoneNo": "8989898989",
22       "name": "Sanskriti Patil",
23       "pulse": 63,
24       "oximeter": 168,
25       "bp": 93
26     }
27   ]
28 }
```

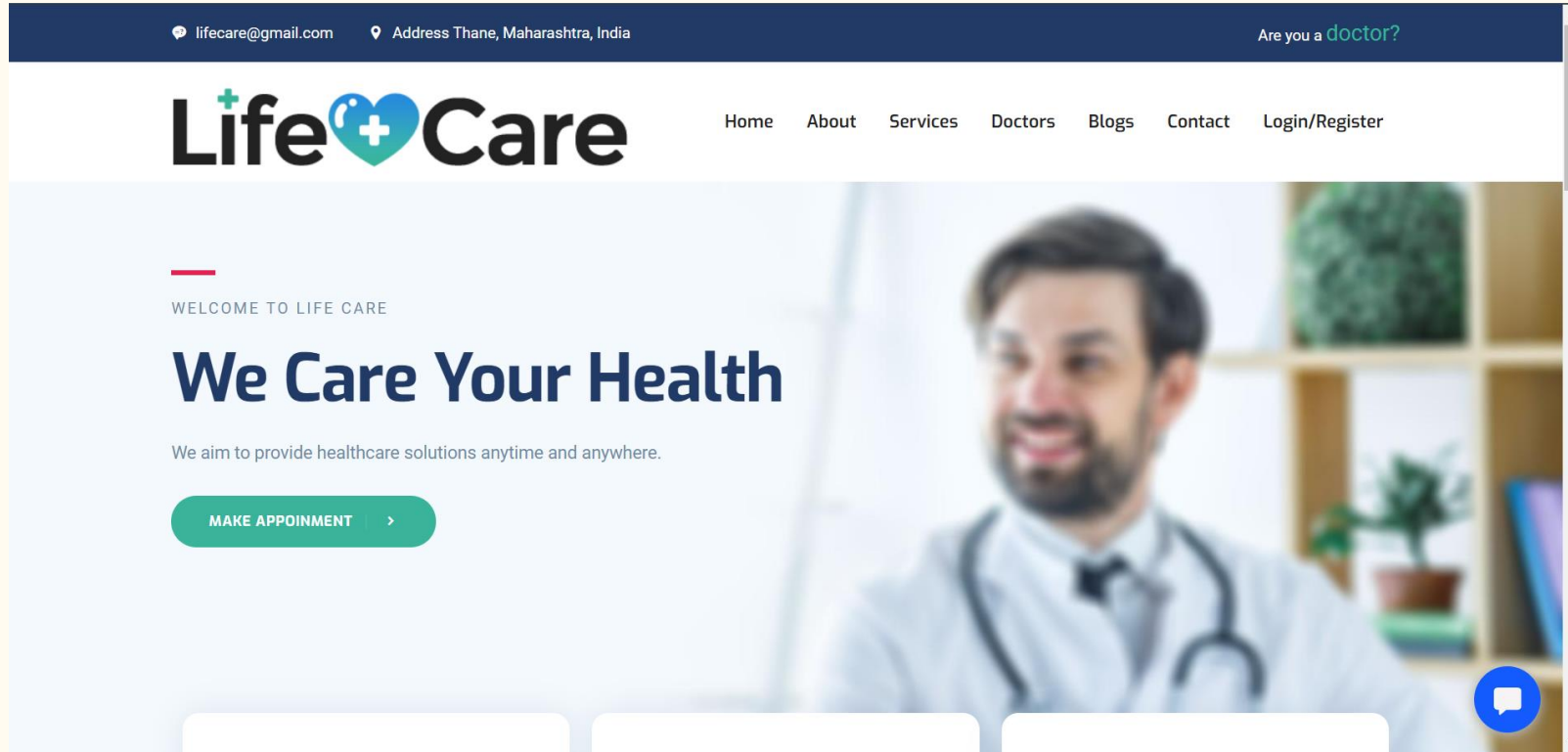
## 4.6 Testing– Health Bot



# 5. Result

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## 5.1 Results – Web-based portal



## 5.2 Results – Patient Side

lifecare@gmail.com

Address Thane, Maharashtra, India

Call Now : 123-456-7891

+

Life

+

Care

Home

About

Services

Blogs

Contact

Logout

Ajay YadavBook AppointmentMy AppointmentAnalysis

Doctor Schedule List

Show

10

entries

Search:

Doctor Name	Education	Speciality	Appointment Date	Appointment Day	Available Time	Action
Dr. Shreya Nair	MBBS	Cardiologist	2021-05-13	Thursday	11:10	GET APPOINTMENT
Dr. Shweta Chaudhari	MSc	Physiotherapy	2021-05-13	Thursday	16:44	GET APPOINTMENT

## 5.3 Results – Doctor adding schedule

The screenshot displays a web application interface with a dark sidebar on the left containing the following menu items: ADMIN, Doctor Schedule, Appointment, and Profile. The main content area is titled 'Doctor Schedule' and features a 'Doctor Schedule List' section. This section includes a 'Show 10 entries' dropdown, a table with one entry for '2021-05-13', and a 'Showing 1 to 1 of 1 entries' footer. A modal window titled 'Add Doctor Schedule Data' is open in the center, containing the following fields: 'Schedule Date' (calendar icon), 'Start Time' (clock icon), 'End Time' (clock icon), and 'Average Consulting Time' (dropdown menu with 'Select Consulting Duration' selected). The modal has 'Add' and 'Close' buttons at the bottom. In the background, a table with columns 'Consulting Time', 'Status', and 'Action' is visible, showing a row with '5 Minute', 'Active', and edit/delete icons. A search bar and pagination controls ('Previous', '1', 'Next') are also present.

ADMIN

Doctor Schedule

Appointment

Profile

Doctor Schedule

Doctor Schedule List

Show 10 entries

Schedule Date
2021-05-13

Showing 1 to 1 of 1 entries

Add Doctor Schedule Data

Schedule Date

Start Time

End Time

Average Consulting Time

Select Consulting Duration

Add Close

Search:


Consulting Time	Status	Action
5 Minute	Active	

Previous 1 Next

Dr. Shreya Nair



## 5.4 Results – Appointments scheduled for Doctor




Dr. Shreya Bhutada

### Appointment Management

[Appointment List](#)

Show  entries

Search:

Appointment No.	Patient Name	Appointment Date	Appointment Time	Appointment Day	Appointment Status	View
1009	Akshata Singh	2021-05-22	20:52:00	Saturday	Completed	
1006	Akshita Das	2021-05-13	11:25:00	Thursday	Cancel	
1005	Anita Yadav	2021-05-13	11:10:00	Thursday	Completed	

Showing 1 to 3 of 3 entries

Previous

1

Next

## 5.5 Results – Health Parameters

View Appointment Details

X

Patient Details

Patient Name

Akshata Singh

Contact No.

9998887770

Address

Thane, Ghodbunder Road

Analysis

Temp: 29C,  
Blood Pressure: 125mmHg  
Pulse: 73bpm,  
Oximeter: 114%

Appointment Details

Appointment No.

1009

Doctor Name

Dr. Shreya Bhutada

Appointment Date

2021-05-22

Appointment Day

Saturday

Appointment Time

20:52:00

Reason for Appointment

Severe headache

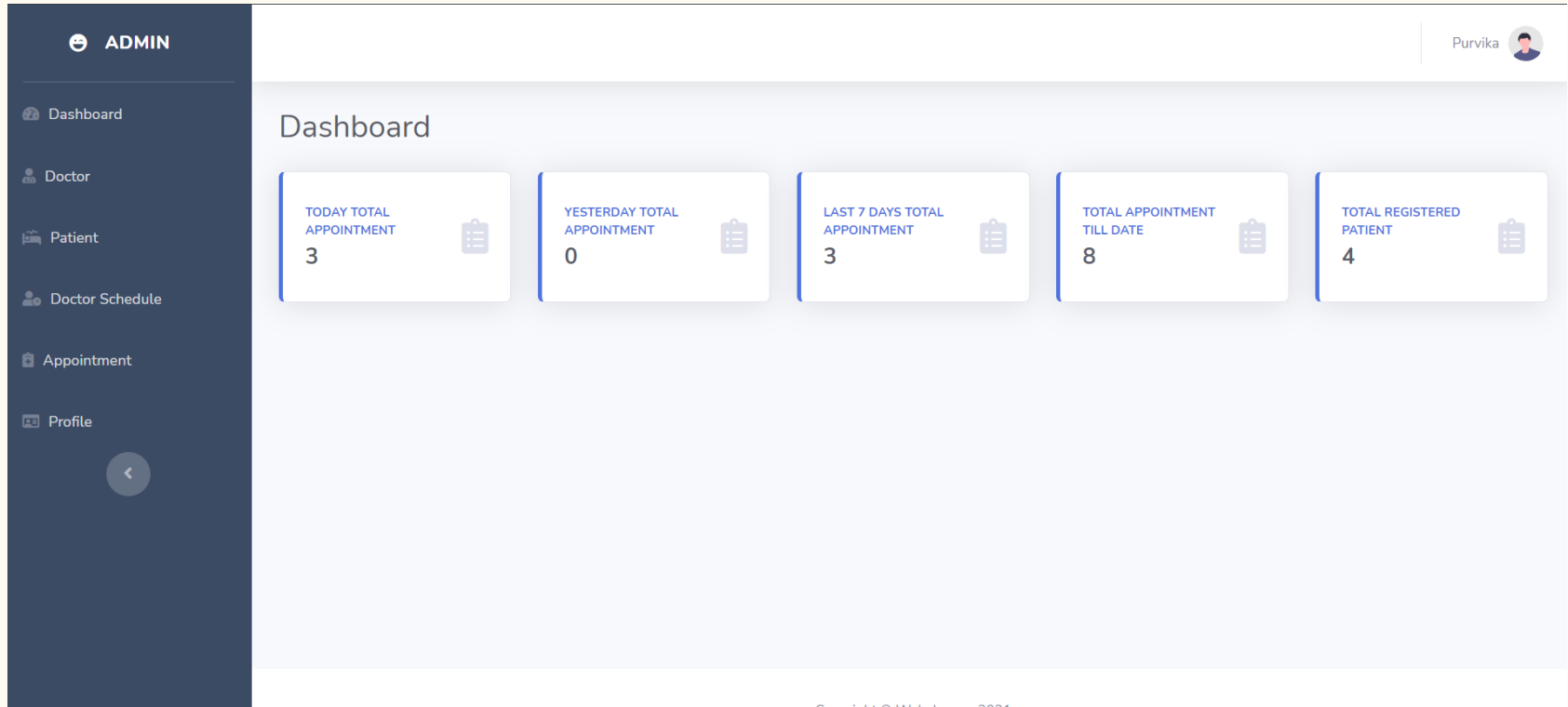
Doctor Comment

Saradon 0-0-1 ( 5days )  
Take steam (Twice a day)

Save

Close

## 5.6 Results – Admin Dashboard



# 5.7 Results – Patient Management

ADMIN

Dashboard

Doctor

Patient

Doctor Schedule

Appointment

Profile

Purvika

## Patient Management

Patient List

Show 10 entries

Search:

First Name	Last Name	Email Address	Contact No.	Email Verification Status	Action
Akshata	Singh	akshata@gmail.com	9998887770	Yes	<div><div></div><div></div><div></div></div>
pur	gai	purvika@gmail.com	1111111111	Yes	<div><div></div><div></div><div></div></div>
Ajay	Yadav	ajay@gmail.com	1234567899	Yes	<div><div></div><div></div><div></div></div>
a	s	anotherakshu@gmail.com	999	Yes	<div><div></div><div></div><div></div></div>
Anita	Yadav	a@gmail.com	1111111111	Yes	<div><div></div><div></div><div></div></div>

Showing 1 to 5 of 5 entries

Previous1Next

# 5.8 Results – Doctor Management

ADMIN

Dashboard

Doctor

Patient

Doctor Schedule

Appointment

Profile

<

Purvika





Doctor Management

Doctor List

+

Show 10 entries

Search:

Image	Email Address	Password	Doctor Name	Doctor Phone No.	Doctor Speciality	Status	Action
	suyash@gmail.com	123456	Dr. Suyash Jain	1234567899	Surgeon	Active	<div><div></div><div></div><div></div></div>
	harshit@gmail.com	123456	Dr. Harshit Chandak	1234567899	Physician	Active	<div><div></div><div></div><div></div></div>
	shweta@gmail.com	123456	Dr. Shweta Chaudhari	1234567899	Physiotherapy	Active	<div><div></div><div></div><div></div></div>
	ayushi@gmail.com	123456	Dr. Ayushi Singh	1234567899	Clinical Nutrition	Active	<div><div></div><div></div><div></div></div>

# 6. Conclusion and Future Scope

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# 6.1 Conclusion

- The proposed system provides healthcare solutions anytime and anywhere.
- It will majorly benefit people living in the rural areas as well as the elderly and disabled people.
- Internet based Things system obtains real-time medical information about a patient and stores it in the cloud as Electronic Health Record which helps in data management.
- The health bot helps in better understanding of the medical terminologies and provides a customized service to the patients via text analysis.
- Our web application along with health bot can contribute to ease of accessibility to the masses as it can be used by rural people through mobile phones.
- We aim to make virtual assistance to doctors, patients, and workers to build better and well-connected healthcare for society.

## 6.2 Future Scope

- The project is not connected to any pharmaceutical company as of now. The survey made will be used to analyze what type of illness is majorly caused in every region and according to that the supply of medicines to the respective regions can be added. Consequently, it wouldn't lead to shortage of medicines.
- In addition to that, an additional feature will be added on the doctors portal which can directly send the prescription of patients to the pharmacy and the delivery can be made.
- An enhanced version of a health bot will be developed to solve complicated issues and provide more options for consultation.
- We will add advanced machine learning to increase the efficiency of the health bot.



# References

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- Katariya, Vivek & Vitthal, Shinde & Gutte, & Devare, Manoj. (2019). Intelligent Healthbot for Transforming Healthcare.
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- Hossain, Md Anowar & Qureshi, Md. (2020). IoT Based Medical Assistant Robot (Docto-Bot).

# Paper Publication

Paper entitled “Ru-Urb IoT-AI powered Healthcare Kit” is presented and published at “5th International Conference on Intelligent Computing and Control Systems ICICCS 2021” by “Shreya Bhutada”, “Akshata Singh”, “Purvika Gaikar ”and “Kaushiki Upadhyaya”.

**Thank You**

