

Covid patient health monitoring system

1. Introduction

a. Overview

- The mobile app is used to keep track of the covid patients.
- Patients are given a wearable device that measures their body temperature, pulse rate, and blood pressure.
- The health parameters are sent to the IBM IoT platform by the wearable device.
- Nurses and doctors can use the app to keep track on their patients' health even when they are not present.
- If a patient's health metrics are abnormal, they will be notified by text message.

b. Purpose

To monitor and manage the potential infected patients of COVID-19 without failing the COVID protocols by controlling and monitoring the affected ones remotely.

2. Literature Survey

a. Existing problem

In a COVID 19 affected casualty having dense population, controlling affected ones is a humanly impossible task. The protocols for patients are difficult to be followed under such circumstances. The front-line workers

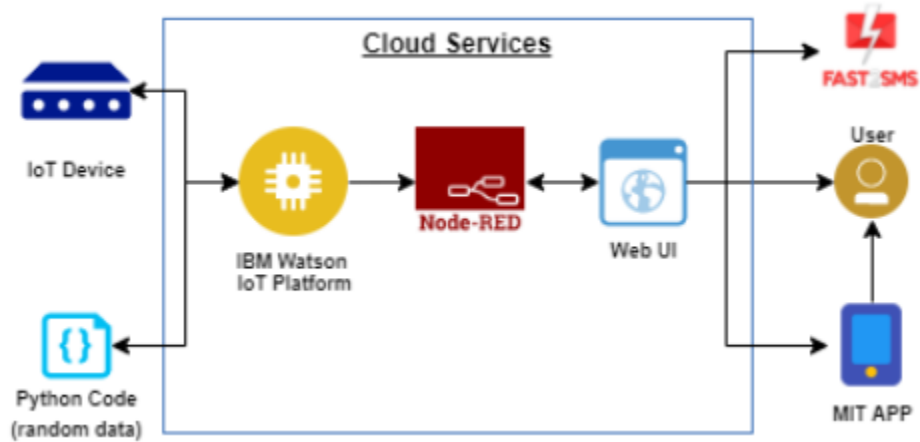
like the doctors and nurses have been exposed to this virus and losing them is a certainty.

b. Proposed solution

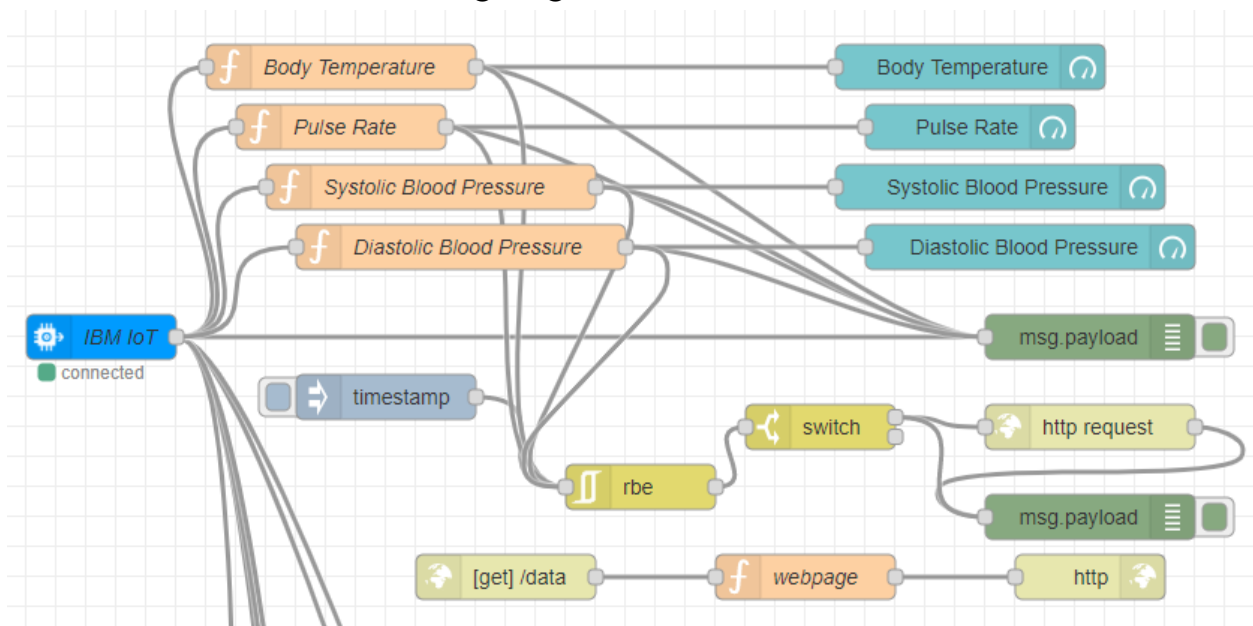
IoT based wearable monitoring device is designed to help in monitoring the COVID affected patients round the clock in-home isolation or in quarantine centres to check the seriousness of their conditions, using their vital parameters like body temperature, blood pressure and pulse rate. The wearable sensor placed on the body is connected to edge node in IoT cloud where the data is processed and analysed to define the state of health condition. The proposed system is implemented with three layered functionalities as wearable IoT sensor layer, cloud layer with Application Peripheral Interface (API) and Android web layer for mobile phones. Each layer has individual functionality, first the data is measured from IoT sensor layer to define the health symptoms. The next layer is used to store the information in the cloud database for preventive measures, alerts, and immediate actions. The Android mobile application layer is responsible for providing notifications alert to the doctor.

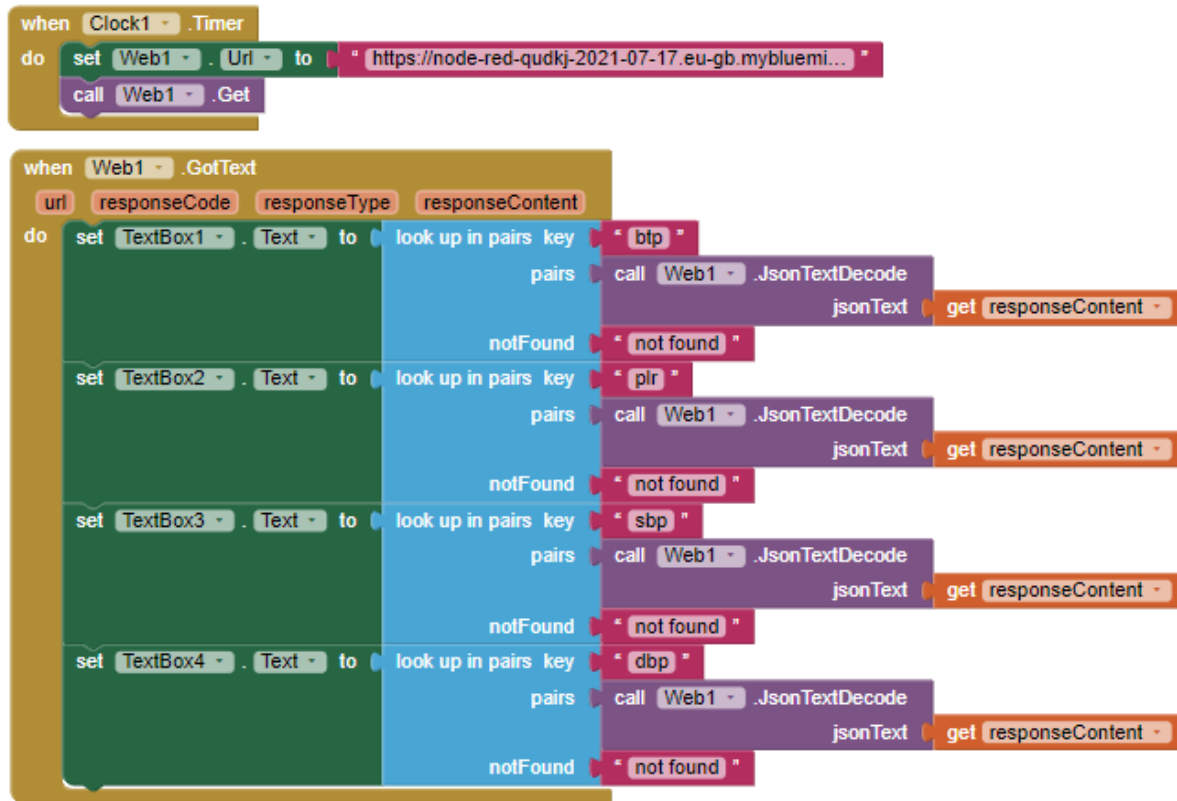
3. Theoretical Analysis

a. Block diagram



b. Hardware / Software designing



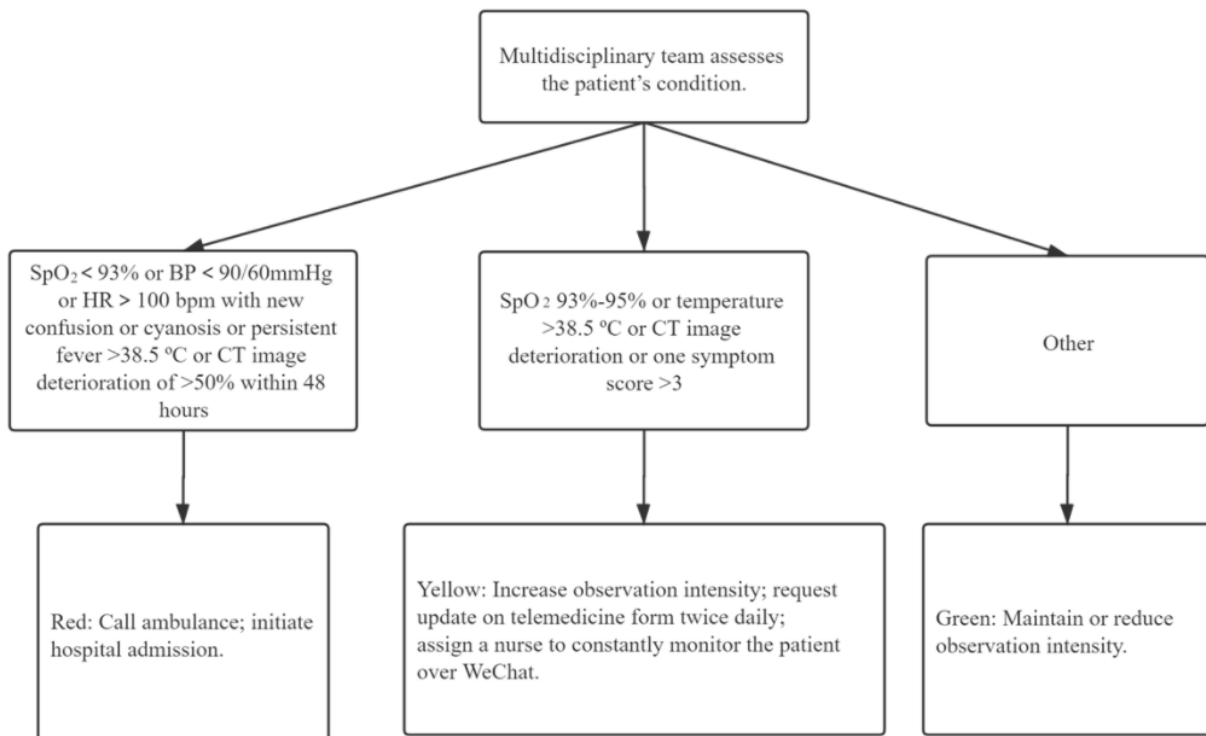


4. Experimental Investigations

The display software should have features like patient details and the important health parameters. In case of any emergency different alerts are to be generated to caution the front-line workers. Once we achieve this task, the doctors can download the data on their mobile phone, laptop/desktop through application software (App). In case of abnormalities in the parameters, the doctor can interact with the patient over the phone and provide medical advice. This will help our front-line warriors to avoid exposure to the infected patients and also reduce the usage of PPE kits which they had to wear for a long duration. The wireless wearable which should be small, portable, and easy to use will enable the patients to better access the health care, improve the quality of healthcare and also provide healthcare workers with better patient care through constant monitoring of patients. This will decrease the emergency room

visits and the admission to the hospitals, in turn, providing a better capacity to treat more patients. The integrated system has both API and mobile application synchronized with each other for predicting and alarming the situation. The design serves as an essential platform that defines the measured readings of COVID-19 symptoms for monitoring, management, and analysis. Furthermore, the work disseminates how digital remote platform as wearable device can be used as a monitoring device to track the health and recovery of a COVID-19 patient.

5. Flowchart



6. Result

We have developed the IoT based wearable monitoring device to help in monitoring the COVID affected patients round the clock in-home isolation or in quarantine centres to check the seriousness of their conditions, using

their vital parameters like body temperature, blood pressure and pulse rate and the Remote Patient Monitoring doctors quickly developed care plans specific to patients with COVID-19.

7. Advantages & Disadvantages

- This will help our front-line warriors to avoid exposure to the infected patients and also reduce the usage of PPE kits which they had to wear for a long duration.
- better patient care through constant monitoring of patients.
- This will decrease the emergency room visits and the admission to the hospitals.
- providing a better capacity to treat more patients

8. Applications

After rigorous testing and evaluation, the proposed system can be deployed in hospitals for use in various units. The designed mobile and web application, once fully developed, can be plugged into existing web domains of hospitals as a portal and can be launched as a fresh application for hospitals without existing domains. It is also recommended that new features such as a physiological data capturing device be incorporated into the current system.

9. Conclusion

In this Project, an IoT based wearable monitoring device is designed to measure various vital signs related to COVID-19 and notify the doctor if the health parameters are abnormal.

10. Future Scope

As a future direction, we plan to extend our application beyond Android platform to other IOS platforms for wide adaptability. With the efficient technique presented in this project, it is believed that this research can be extended to other areas of IoT such as agriculture for monitoring of livestock and consultation of farmers with veterinary doctors towards diagnosis, prescription and treatment of diseases in livestock in farms. Also, the new system can be extended for use in the pharmaceutical sector. The doctors can send prescriptions to the pharmacist for recommendation of dosage and possible dispensing of medications to patients. Finally, it will be of interest to carry out an evaluation of the overall performance of the proposed system using different mathematical and statistical evaluation tools.

11. Bibliography

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- [2] https://smartinternz.com/Student/guided_project_info/4792#
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- [4] <https://www.youtube.com/watch?v=2xlvEuFcUJY&feature=youtu.be>
- [5] <https://youtu.be/R46iK-XYKW4>
- [6] <https://youtu.be/Doh9ADU8CyU>
- [7] <http://ai2.appinventor.mit.edu/>
- [8] <http://www.iotgyan.com/learning-resource/sending-sensor-data-from-raspberry-pi-to-ibm-watson->
- [9] https://github.com/gnaneshwarbandari/IOT/blob/main/ibm_code.py
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[13] <https://smartbridge.teachable.com/courses/1450127/lectures/33562536>

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12. Appendix

a. Source code

```
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId": "jmhx1u",
        "typeId": "SmartDevice",
        "deviceId": "2468"
    },
    "auth": {
        "token": "246810xd"
    }
}

def myCommandCallback(cmd):
    print("Message received from IBM IoT Platform: %s" %
```



```

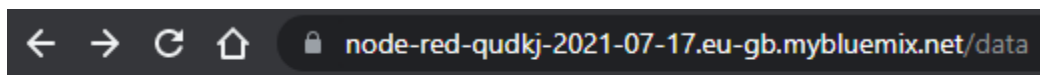
cmd.data['command'])
    m=cmd.data['command']

client = wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None)
client.connect()

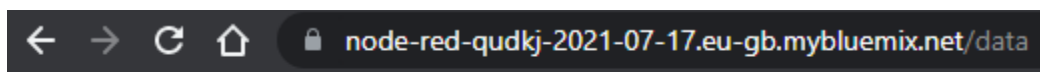
while True:
    btp=round(random.uniform(95.0,102.0), 1)
    plr=random.randint(40,120)
    sbp=random.randint(60,150)
    dbp=random.randint(40,100)
    myData={'body_temperature':btp, 'pulse_rate':plr,
'systolic_blood_pressure':sbp, 'diastolic_blood_pressure':dbp}
    client.publishEvent(eventId="status", msgFormat="json", data=myData,
qos=0, onPublish=None)
    print("Published data Successfully: %s", myData)
    client.commandCallback = myCommandCallback
    time.sleep(2)
client.disconnect()

```

b. UI output Screenshot.



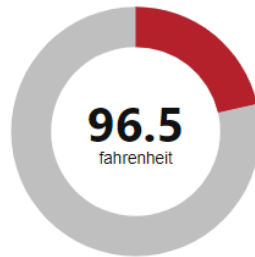
```
{"btp":101.8,"plr":99,"sbp":144,"dbp":95}
```



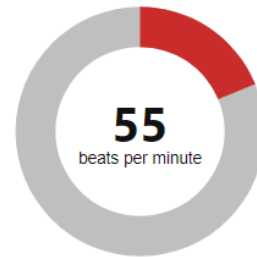
```
{"btp":95.1,"plr":115,"sbp":143,"dbp":69}
```

Sensor Data

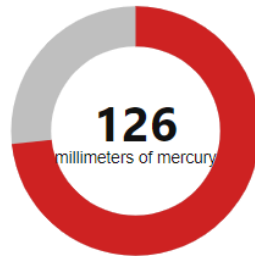
Body Temperature



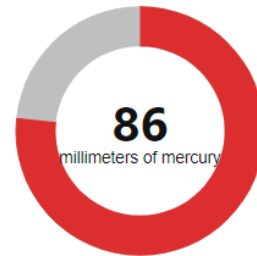
Pulse Rate



Systolic Blood Pressure

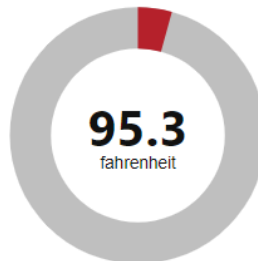


Diastolic Blood Pressure

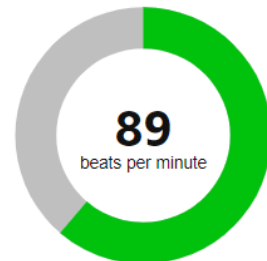


Sensor Data

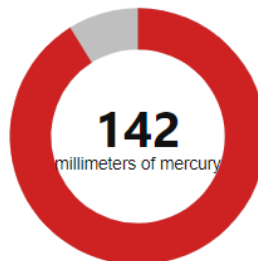
Body Temperature



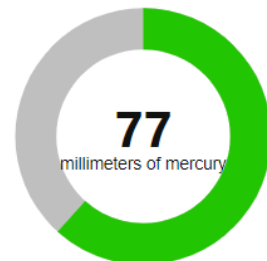
Pulse Rate



Systolic Blood Pressure

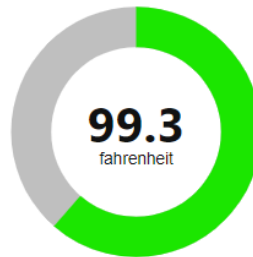


Diastolic Blood Pressure



Sensor Data

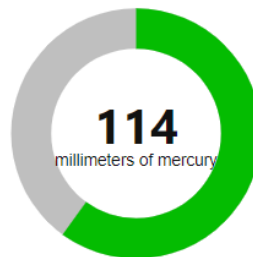
Body Temperature



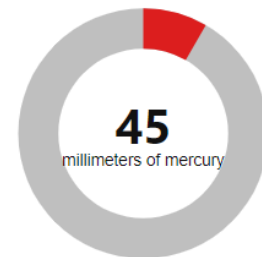
Pulse Rate



Systolic Blood Pressure



Diastolic Blood Pressure



Fast2sms:

2 30-7 11:16 PM

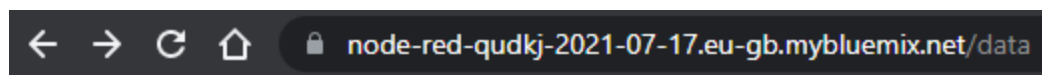
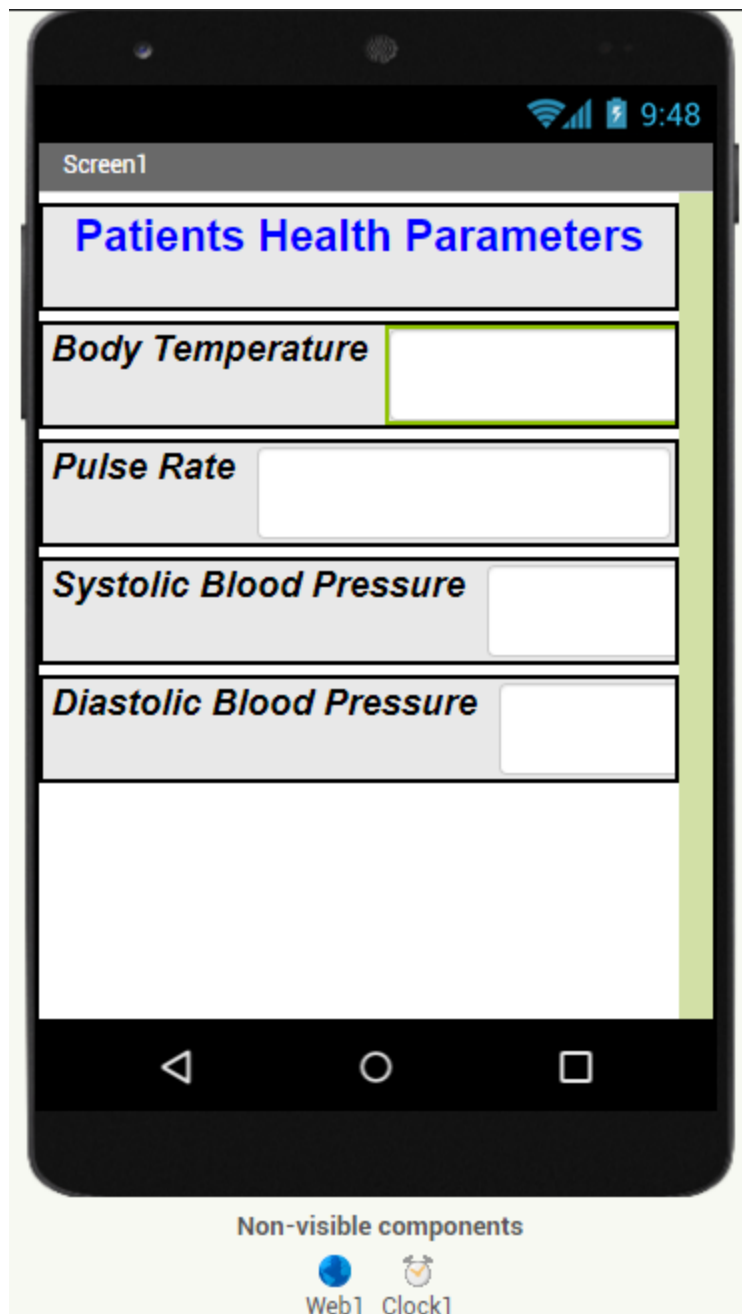
Dear Doctor,
your patient's health parameters
are abnormal.



Text message

2





```
{"btp":101.8,"plr":99,"sbp":144,"dbp":95}
```



Patients Health Parameters



Value



101.9 °F

Body Temperature

```
Published data Successfully: %s ('body_temperature': 96.1, 'pulse_rate': 72, 'systolic_blood_pressure': 147, 'diastolic_blood_pressure': 74)
Published data Successfully: %s ('body_temperature': 101.2, 'pulse_rate': 46, 'systolic_blood_pressure': 86, 'diastolic_blood_pressure': 44)
Published data Successfully: %s ('body_temperature': 97.7, 'pulse_rate': 40, 'systolic_blood_pressure': 81, 'diastolic_blood_pressure': 72)
Published data Successfully: %s ('body_temperature': 101.1, 'pulse_rate': 55, 'systolic_blood_pressure': 122, 'diastolic_blood_pressure': 91)
Published data Successfully: %s ('body_temperature': 98.7, 'pulse_rate': 92, 'systolic_blood_pressure': 103, 'diastolic_blood_pressure': 97)
Published data Successfully: %s ('body_temperature': 100.6, 'pulse_rate': 79, 'systolic_blood_pressure': 114, 'diastolic_blood_pressure': 86)
Published data Successfully: %s ('body_temperature': 97.5, 'pulse_rate': 55, 'systolic_blood_pressure': 126, 'diastolic_blood_pressure': 53)
Published data Successfully: %s ('body_temperature': 100.3, 'pulse_rate': 53, 'systolic_blood_pressure': 110, 'diastolic_blood_pressure': 95)
Published data Successfully: %s ('body_temperature': 99.9, 'pulse_rate': 95, 'systolic_blood_pressure': 139, 'diastolic_blood_pressure': 72)
Published data Successfully: %s ('body_temperature': 95.8, 'pulse_rate': 106, 'systolic_blood_pressure': 74, 'diastolic_blood_pressure': 49)
Published data Successfully: %s ('body_temperature': 99.9, 'pulse_rate': 56, 'systolic_blood_pressure': 140, 'diastolic_blood_pressure': 41)
Published data Successfully: %s ('body_temperature': 95.8, 'pulse_rate': 64, 'systolic_blood_pressure': 134, 'diastolic_blood_pressure': 83)
Published data Successfully: %s ('body_temperature': 97.0, 'pulse_rate': 43, 'systolic_blood_pressure': 82, 'diastolic_blood_pressure': 59)
Published data Successfully: %s ('body_temperature': 95.5, 'pulse_rate': 49, 'systolic_blood_pressure': 91, 'diastolic_blood_pressure': 53)
Published data Successfully: %s ('body_temperature': 101.6, 'pulse_rate': 117, 'systolic_blood_pressure': 84, 'diastolic_blood_pressure': 66)
```

Patients Health Parameters

Body Temperature 97.7

Pulse Rate 119

Systolic Blood Pressure 86

Diastolic Blood Pressure 64

Patients Health Parameters

Body Temperature 96.2

Pulse Rate 94

Systolic Blood Pressure 133

Diastolic Blood Pressure 79

Patients Health Parameters

Body Temperature 101.2

Pulse Rate 81

Systolic Blood Pressure 95

Diastolic Blood Pressure 80

7/30/2021, 8:23:40 PM node: abb5c658.e9d588
iot-2/type/SmartDevice/id/2468/evt/status/fmt/json :
msg.payload : Object

```
▶ { body_temperature: 98.8,  
  pulse_rate: 53,  
  systolic_blood_pressure: 120,  
  diastolic_blood_pressure: 74 }
```

7/30/2021, 8:23:40 PM node: abb5c658.e9d588
iot-2/type/SmartDevice/id/2468/evt/status/fmt/json :
msg.payload : number

98.8

7/30/2021, 8:23:40 PM node: abb5c658.e9d588
iot-2/type/SmartDevice/id/2468/evt/status/fmt/json :
msg.payload : number

53

7/30/2021, 8:23:40 PM node: abb5c658.e9d588
iot-2/type/SmartDevice/id/2468/evt/status/fmt/json :
msg.payload : number

120

7/30/2021, 8:23:41 PM node: abb5c658.e9d588
iot-2/type/SmartDevice/id/2468/evt/status/fmt/json :
msg.payload : number

74

7/30/2021, 8:23:41 PM node: abb5c658.e9d588
iot-2/type/SmartDevice/id/2468/evt/status/fmt/json :
msg.payload : Object

```
▶ { body_temperature: 99.6,  
  pulse_rate: 58,  
  systolic_blood_pressure: 89,  
  diastolic_blood_pressure: 95 }
```

7/30/2021, 8:23:41 PM node: abb5c658.e9d588
iot-2/type/SmartDevice/id/2468/evt/status/fmt/json :
msg.payload : number

99.6

7/30/2021, 8:23:41 PM node: abb5c658.e9d588
iot-2/type/SmartDevice/id/2468/evt/status/fmt/json :
msg.payload : number

58

7/30/2021, 8:23:41 PM node: abb5c658.e9d588
iot-2/type/SmartDevice/id/2468/evt/status/fmt/json :
msg.payload : number

89

7/30/2021, 8:23:41 PM node: abb5c658.e9d588
iot-2/type/SmartDevice/id/2468/evt/status/fmt/json :
msg.payload : number

95

7/30/2021, 11:16:40 PM node: 75f3985c.5a6208
msg.payload : string[83]

```
"  
{ "return":true,"request_id":"26lctgw4  
p9uk7id","message":["SMS sent  
successfully."]}"
```

7/30/2021, 11:19:56 PM node: 75f3985c.5a6208
msg.payload : string[62]

```
"  
{ "return":false,"status_code":411,"me  
ssage":"Invalid Numbers"}"
```