

SmartBridge IOT Project- Soldier Health Monitoring System Using IBM Cloud

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Table of Contents

1.INTRODUCTION.	2
(a)Overview.	2
(b)Purpose.	2
2.LITERATURE SURVEY.	2
(a)Existing Problem.	2
(b)Proposed Solution.	2
3. THEORETICAL ANALYSIS	3
(a) Block Diagram.	3
(b) Software Designing.	3
4. EXPERIMENTAL INVESTIGATION.	4
5. FLOWCHART.	4
6. RESULT.	5
7. ADVANTAGES AND DISADVANTAGES.	5
Advantages:	5
Disadvantages:	5
8. APPLICATIONS.	5
9. CONCLUSION.	6
10. FUTURE SCOPE.	6
11. BIBLIOGRAPHY.	7
12. APPENDIX.	8
(a) Source code.	8
(b) UI output Screenshot	10

1.INTRODUCTION

(a) Overview

Our project is Soldier Health Monitoring System Using IBM Cloud. We have obtained random location of the soldiers and their health conditions which includes temperature, pulse rate and blood pressure using python code and sent it to the cloud. We have used Node-RED to configure the flow to receive the data. Cloudant DB nodes are used to store the received data in the Cloudant DB. The data is published in the web application.

(b) Purpose

The purpose of this project is to track the location of the soldiers in a certain range and to check if their health condition is normal or abnormal. If the soldier is out of range, then a notification is sent to the authorities. If the received data of the health conditions of the soldiers is not normal then a corresponding notification is sent to the authorities as well. This is a highly useful application as we can track and analyse the condition and the location of the soldier without direct communication.

2.LITERATURE SURVEY

(a) Existing Problem

Tracking the soldiers is a pivotal function to carry out in the military. This will increase the efficiency and provide aid to the soldiers whose health conditions are sensed to be abnormal. At present only through communication can the authorities obtain information about the condition of their soldiers.

(b) Proposed Solution

We propose to solve this issue by obtaining the sensor data of the soldiers and analyse their health condition and location. The data will be displayed in the form

of visual representation in the web application and if the parameters such as temperature, pulse and blood pressure are not within the normal range of a healthy person then the authorities are promptly notified with the corresponding message. The sensor data is also stored in the Cloudant DB.

2.LITERATURE SURVEY

(a) Existing Problem

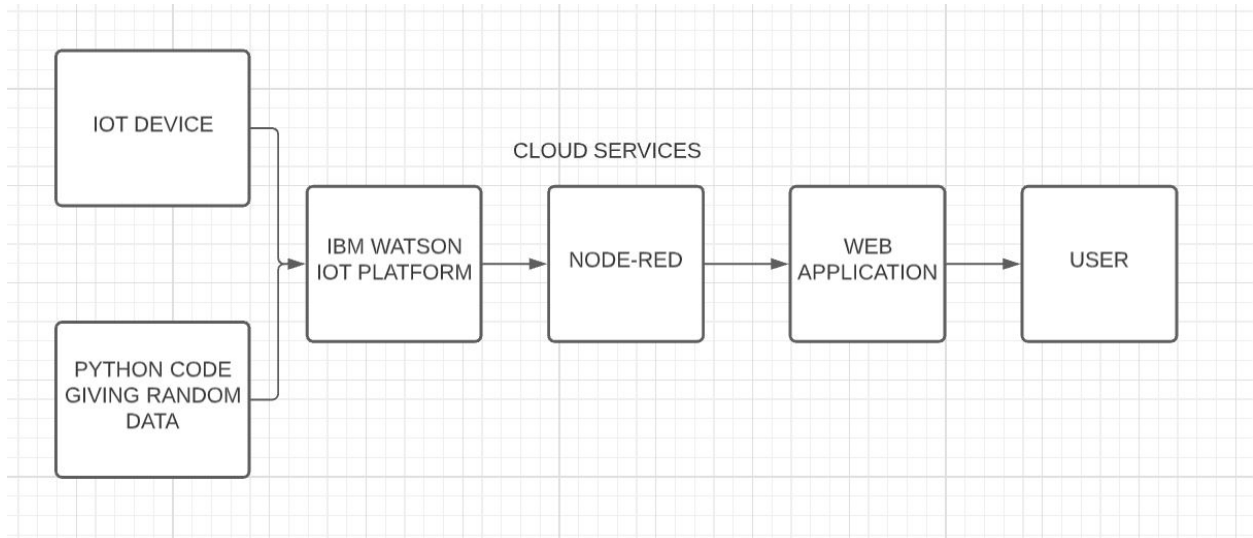
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(b) Proposed Solution

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3. THEORETICAL ANALYSIS

(a) Block Diagram



(b) Software Designing

We develop a python code to obtain random sensor data for location (latitude and longitude), body temperature, pulse rate and blood pressure.

We integrate the code with IBM Cloudant and store the received data in IBM Database.

Using dashboard nodes, we create a User Interface in Node-RED which displays the sensor data.

When the health conditions of the soldier is out of normal range, suitable alert notification is sent to the authorities.

4. EXPERIMENTAL INVESTIGATION

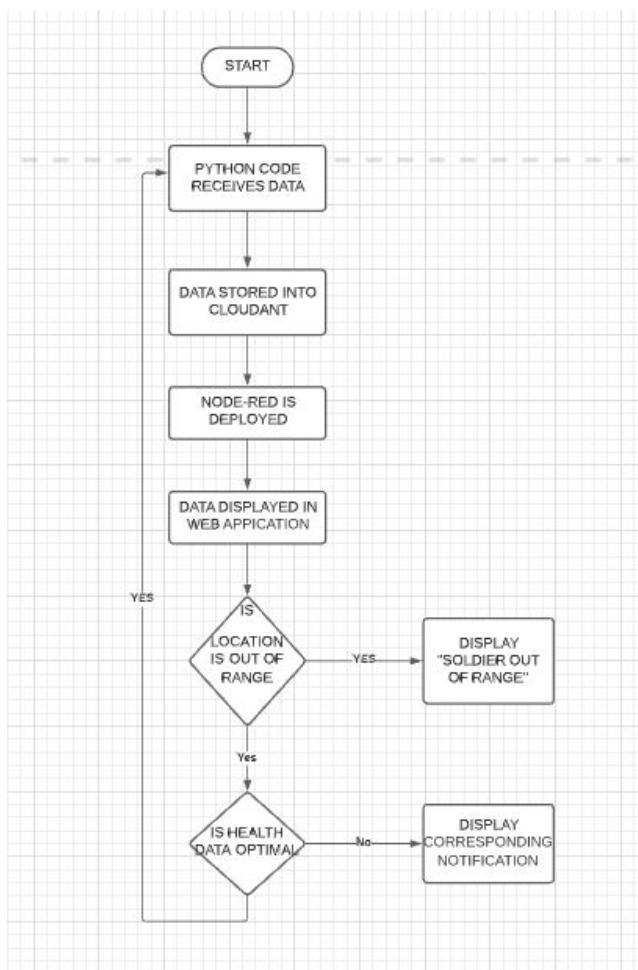
Python code was developed using in-built packaged and functions and generate the soldier data.

Node-RED dashboards required was studied and installed for plotting the location of the soldier.

We have collected the normal range of body temperature, pulse rate, and blood pressure to cross check with the received data from soldiers.

The user interface is designed for understanding the data with ease using suitable charts for display.

5. FLOWCHART



6. RESULT

By following the above steps, we have displayed the data in the web UI and stored the data in IBM Cloud. The location of the soldiers is tracked and health condition is monitored.

7. ADVANTAGES AND DISADVANTAGES

Advantages:

The IoT based soldier health monitoring system allows the monitoring of a soldier's body temperature, blood pressure levels and pulse rate. It also helps us track the location of the soldier, which is immensely useful during times of emergencies. The exact location and health status can be sent to the base station in real time, so that required actions can be taken in the base station. It is a highly reliable and cost-effective system. Due to the inclusion of IoT, it performs at high speed and transmits data faster.

Disadvantages:

One of the major drawbacks of this system is the short range it offers. It might be difficult to transmit accurate data when the soldier is far away from the base station. Data transmission can also be affected by rough weather and connectivity issues. In addition to this, wifi-based systems are always prone to hackers who might meddle with the data being sent to the bases.

8. APPLICATIONS

This system can be of great use in the military to track and monitor the location and health condition of soldiers. Since the system allows us to measure various health parameters, it can give the officials in the base the exact health status of the soldier without having to go to the field. This can be useful in detecting emergencies during times of extreme weather conditions to immediately rescue the soldier.

Apart from this, the accurate location data of the soldier can also be transmitted to the army base. This enables them to know the current position of the soldier and

can be useful in alerting them if any incoming danger is detected. This is also useful in times of war to find out if the soldier is in close proximity with enemies and can be used to warn them to move to safer locations.

9. CONCLUSION

From the proposed system above, we conclude that transmission happens at fixed intervals of time and the readings are accurate. From the soldier unit the data is transmitted to the base camp unit and if any abnormalities are notified in the health conditions, the officials in the base station are immediately notified about it. This would really help in early tracking of danger and immediate actions can be taken to save lives of soldiers. This system helps in monitoring the health parameters of the soldier, atmospheric conditions and their locations.

The system also assists the soldier in getting help from the army base camp and or from another fellow soldier in situations of emergency. This would be very useful to military forces during war and rescue operations since the system can be used without any network restriction. Hence this system provides safety and protection to soldiers. The system has a very effective modelling design. The system is a reasonable one as it can be easily attached to the hand of the soldier.

10. FUTURE SCOPE

For any system, there is always scope for improvement with development in technology in upcoming times. With regard to the soldier health and location monitoring system, a compatible and better routing algorithm can be utilized to make this system much more reliable and efficient in terms of energy. New technologies can be incorporated in order to expand the capacity of data transmission. Methods to increase the number of health parameters being measured can be taken.

Additional features such as the attachment of a microphone can be done to the system in order to record external voices and also directly communicate with the soldier. A camera can also be added to take pictures of the location of the soldier so

that tracking can be made easier in times of emergency. The range of communication of the system can also be expanded in order to expand the area of coverage and to ensure that data transmission is not stopped due to the increase in distance between the base station and the present location of the soldier.

11. BIBLIOGRAPHY

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- IoT Based Soldier Monitoring System Arya V Nair, Rani Raju, Tinsa Elsa Thomas, Vidya R Nair, Nidiya Habeeb #5

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12. APPENDIX

(a) Source code

```
import wiotp.sdk.device
```

```
import time
```

```
import json
```

```
import random
```

```
import geocoder
```

```
myConfig = {
```

```
    "identity": {
```

```
        "orgId": "x012hb",
```

```
        "typeId": "VITDevice",
```

```
        "deviceId": "500062"
```

```
    },
```

```
    "auth": {
```

```
        "token": "12345678"
```

```
    }
```

```
}
```

```
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:
```

```
    t=random.randint(90,110) #Body temperature in Fahrenheit
```

```
    p=random.randint(40,120) #Pulse rate in beats per minute
```

```
    #Blood pressure(systolic(s) & diastolic(d))-measured in mm Hg:
```

```
    d=random.randint(80,140)
```

```
    s1=random.randint(60,80) #systolic range for low Blood Pressure
```

```
    s2=random.randint(80,90) #systolic range for high Blood Pressure
```

```
    if (d<=120):
```

```
        s=s1
```

```
    if(d>=120):
```

```
        s=s2
```

```
    b = str(d) + "/" + str(s)
```

```
    #Tracking current location (latitude & longitude) using geocoder:
```

```
    soldier=random.randint(1,10) #Just a random number for Soldier
```

```
    #g = geocoder.ip('me') #Location of the soldier when's he within the required
```

area

```
g = geocoder.ip('199.7.157.0') #Random location to consider Soldier is not in the  
required area
```

```
name="Soldier" + str(soldier)
```

```
la=(g.latlng[0]) #Latitude of soldier location
```

```
lo=(g.latlng[1]) #Longitude of soldier location
```

```
myData={'name':name,'temperature':t, 'pulserate':p,'bloodpressure':b  
, 'systolic':s,'diastolic':d, 'lat':la, 'lon':lo }
```

```
client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0,  
onPublish=None)
```

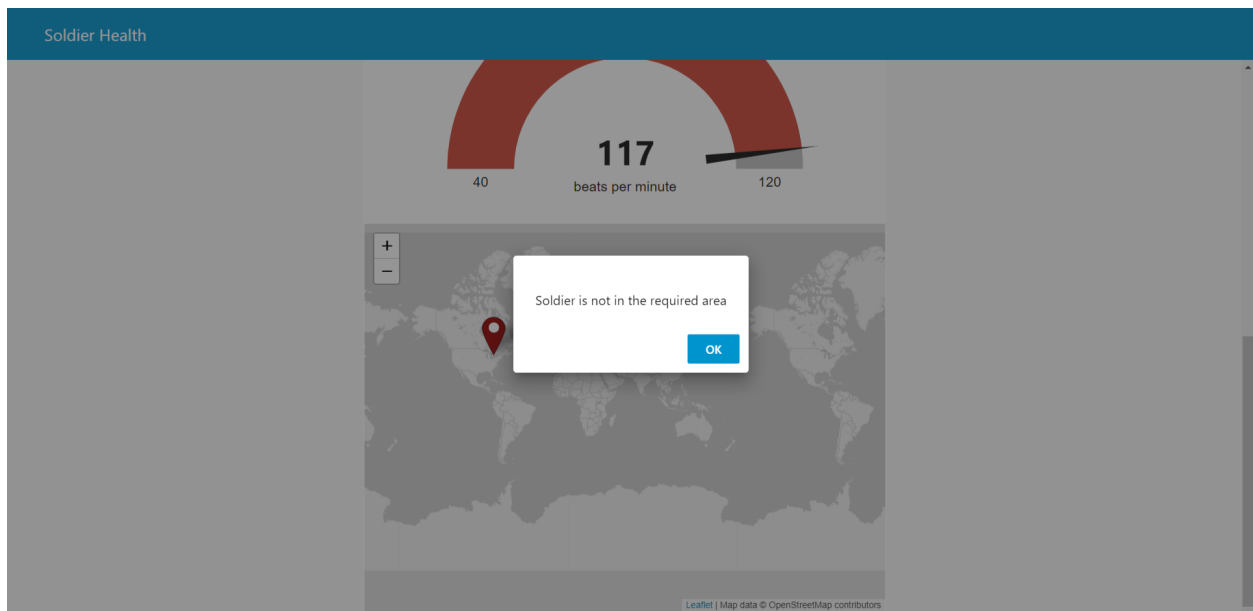
```
print("Published data Successfully: %s", myData)
```

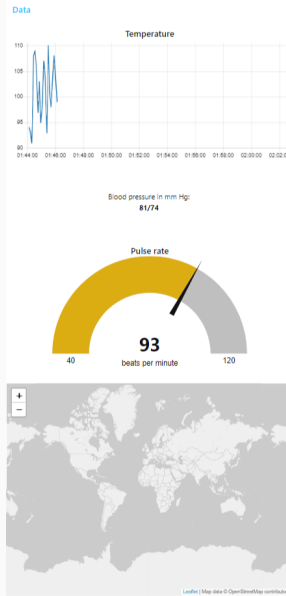
```
client.commandCallback = myCommandCallback
```

```
time.sleep(6)
```

```
client.disconnect()
```

(b) UI output Screenshot

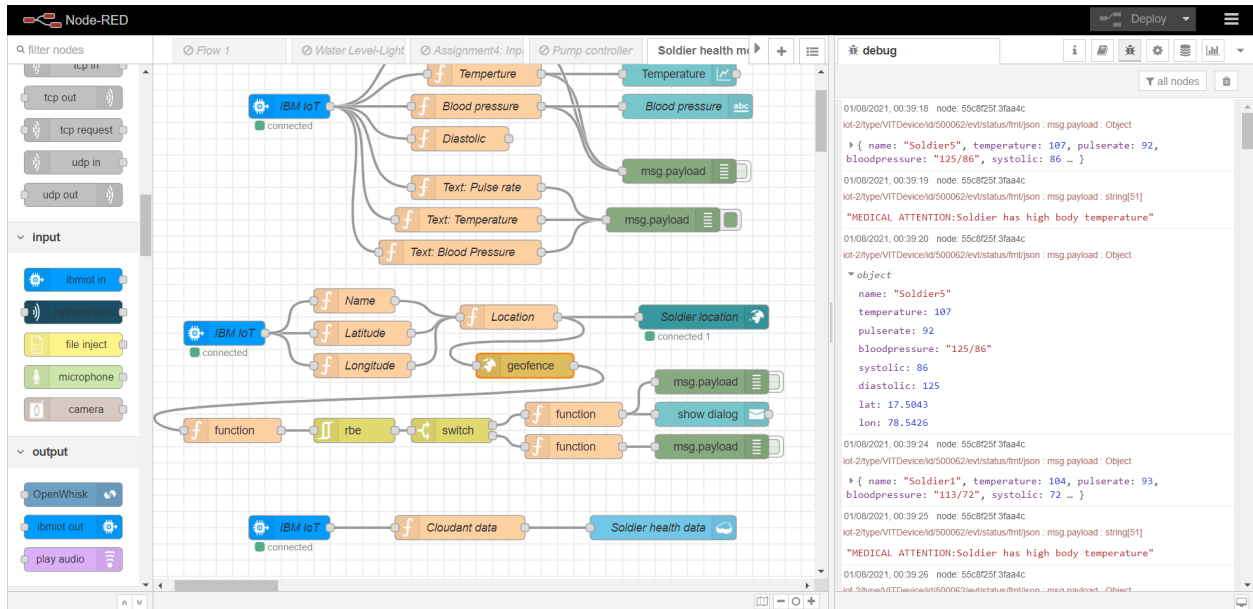
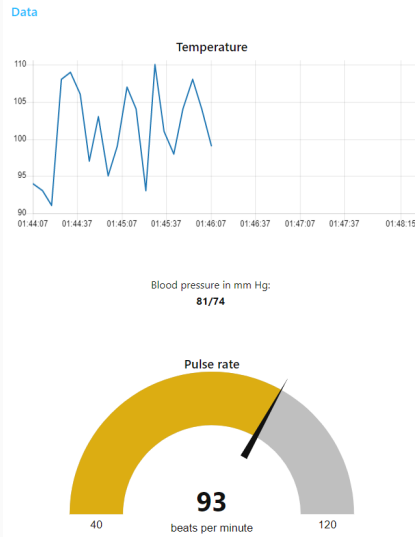




Soldier Health

40 93 120
beats per minute





Node-RED interface showing a flow configuration and the 'Edit geofence node' dialog.

Flow Configuration:

- Input: `ibmiot in` (connected) → `function` node.
- Output: `function` node → `rbe` node → `ibmiot out` (connected).
- Properties: `Name`, `Latitude`, `Longitude`.

Edit geofence node dialog:

- Map:** Shows a map of India with a geofence circle centered over Hyderabad.
- Properties:**
 - `Floor`: `ground`
 - `Ceiling`: `Infinity`
 - `Action`: `add "inarea" property`
 - `Enable output of zones to WorldMap node`: ☐
 - `Enabled`: ☐
- Info Panel:**
 - `Node`: `te634b43.36bfb8`
 - `Type`: `geofence`

Node-RED interface showing a flow configuration and the 'debug' console output.

Flow Configuration:

- Input: `ibmiot in` (connected) → `function` node.
- Output: `function` node → `rbe` node → `ibmiot out` (connected).
- Properties: `Name`, `Latitude`, `Longitude`.

Debug Console Output:

```
2021-07-11 01:44:07.141 v10p.wdk.device-client.DeviceClient INFO Connected successfully: dx3312b:V772Device:500042
Published data Successfully: {s: {name: 'Soldier9', 'temperature': 94, 'pulseRate': 83, 'bloodPressure': '91/72', 'systolic': 72, 'diastolic': 91, 'lat': 43.7001, 'lon': -79.4163}}
Published data Successfully: {s: {name: 'Soldier2', 'temperature': 93, 'pulseRate': 92, 'bloodPressure': '81/75', 'systolic': 75, 'diastolic': 81, 'lat': 43.7001, 'lon': -79.4163}}
Published data Successfully: {s: {name: 'Soldier8', 'temperature': 91, 'pulseRate': 78, 'bloodPressure': '94/71', 'systolic': 71, 'diastolic': 94, 'lat': 43.7001, 'lon': -79.4163}}
Published data Successfully: {s: {name: 'Soldier1', 'temperature': 108, 'pulseRate': 86, 'bloodPressure': '138/80', 'systolic': 80, 'diastolic': 138, 'lat': 43.7001, 'lon': -79.4163}}
Published data Successfully: {s: {name: 'Soldier3', 'temperature': 105, 'pulseRate': 61, 'bloodPressure': '81/67', 'systolic': 67, 'diastolic': 81, 'lat': 43.7001, 'lon': -79.4163}}
Published data Successfully: {s: {name: 'Soldier8', 'temperature': 106, 'pulseRate': 104, 'bloodPressure': '135/83', 'systolic': 83, 'diastolic': 135, 'lat': 43.7001, 'lon': -79.4163}}
Published data Successfully: {s: {name: 'Soldier4', 'temperature': 97, 'pulseRate': 57, 'bloodPressure': '129/88', 'systolic': 88, 'diastolic': 129, 'lat': 43.7001, 'lon': -79.4163}}
Published data Successfully: {s: {name: 'Soldier3', 'temperature': 103, 'pulseRate': 92, 'bloodPressure': '139/88', 'systolic': 88, 'diastolic': 139, 'lat': 43.7001, 'lon': -79.4163}}
Published data Successfully: {s: {name: 'Soldier8', 'temperature': 95, 'pulseRate': 97, 'bloodPressure': '124/81', 'systolic': 81, 'diastolic': 124, 'lat': 43.7001, 'lon': -79.4163}}
Published data Successfully: {s: {name: 'Soldier7', 'temperature': 99, 'pulseRate': 82, 'bloodPressure': '105/71', 'systolic': 71, 'diastolic': 105, 'lat': 43.7001, 'lon': -79.4163}}
```

Showing document 1 - 100. Documents per page: 100

```
1 {
2   "id": "1924f0d475731eec1b6dfa3a1de61456",
3   "rev": "1-c1fb748f534246947f2f84b0af9d2e6d",
4   "name": "Soldier6",
5   "temperature": 104,
6   "pulse rate": 54,
7   "blood pressure": "136/81",
8   "latitude": 43.7001,
9   "longitude": -79.4163
10 }
```