https://github.com/vijaygoldk7/SmartBridgeGuruCool_Health.git

Remote Health Monitoring System With Analytics Dashboard

Category : Internet of Things

Submitted by

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Remote Health Monitoring System With Analytics Dashboard

Category: Internet Of Things

Skills Required:

IOT Cloud Platform ,Node- RED,IBM Watson Studio,IBM Cloudant DB

Project Description:

Project Idea:

Health monitoring systems play a vital role which will help in early detection of the diseases which can reduce the suffering and medical costs. In this Health monitoring system we will be detecting the level of ill health of the person and would recommend few medications that can be taken by him by which he can recover a bit than before using Machine learning and Internet of things.

Introduction:

Benefits of real-time data monitoring

Remote monitoring with real-time data can spot patterns or areas of concern, allowing healthcare professionals to intervene much quicker than if there was a reporting delay. Predictive analytics also allow physicians to compare real-time patient data from monitoring devices to medical baselines, helping them predict which patients are likely to develop complications and need further intervention.

This type of preventive, at-home monitoring could be extremely beneficial not just for patients, but for the healthcare industry as a whole. According to a recent Goldman Sachs report summarized by Business Insider, remote patient monitoring could save over $305 billion in healthcare costs, especially through monitoring patients with chronic diseases, such as heart disease, asthma and diabetes. The report also states that the healthcare community is surprisingly willing to explore digital health solutions such as remote patient monitoring.

The following are a few examples of how healthcare systems are currently using this technology to save money and provide more informed care to their patients.

Customized monitoring systems

According to mHealth News, Northern Arizona Healthcare's "Care Beyond Walls and Wires" program monitors patients using a smartphone application and customized medical devices that vary by condition. Data from the devices is captured in the smartphone application and automatically sent to the patient's medical providers, who can then review it for warning signs or concerning patterns. Estimates from the first 50 patients in the program showed an estimated $92,000 in savings per patient in six months, as well as significant decreases in the rate of hospitalizations and days spent in the hospital.

This type of technology can be customized not only for specific patient needs, but for unique conditions, too. Scripps Translational Science Institute is currently working on monitoring technology that will help workers provide quality care to Ebola patients without putting themselves at risk of contracting the disease. The project will use a sensor similar to an adhesive bandage to take patients' vital signs with two wireless monitors. Through this method, early signs of the disease can be detected while minimizing staff exposure to the virus.

Personal mobile devices for remote monitoring

David Bates, professor at Harvard Medical School and chief of the Division of General Medicine at Brigham and Women's Hospital in Boston, told the American Association of Family Physicians about how physicians can use accelerometers, which are already in most smartphones, to track the movements of post-surgical patients or those with chronic conditions. By using data analytics to flag patients with decreased movement, physicians can be alerted to those whose conditions are deteriorating, prompting real-time check-ins when needed.

Smartwatches are increasing in popularity and can also be used for at-home monitoring. According to mHealth News, the Sense4Baby platform allows expecting mothers to check their baby's heart rate using either a smartphone or Apple Watch. The woman can then send the real-time data to a pediatrician without This allows the doctor to immediately determine if the unborn baby is in distress or if the mother needs to come in for additional monitoring.having to perform any extra steps.

As these examples show, real-time patient health monitoring and savvy use of data analytics can help healthcare providers to improve their quality of service while also boosting health outcomes.

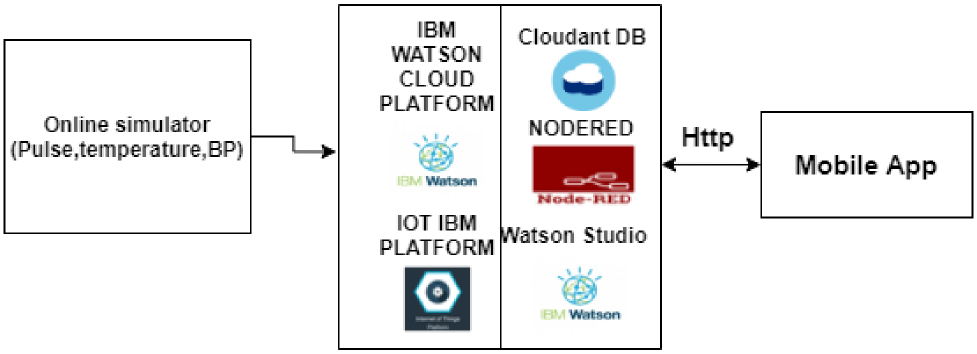
Solution Requirements:

In this proposed system develop a IoT device which can sense the temperature, pulse and BP values of the person and upload it to IBM IoT platform. In the cloud the data will be sent to a Machine learning algorithm to predict his health status and alerting the persons if their health condition is abnormal. Build a dashboard which will visualize the health parameters.

Project Flow:

- Send the health parameters (Temperature,pulse,BP) to IBM IoT platform. Use an online simulator.
- Create a machine learning model using Watson studio and Auto AI experiment which will analyze the health status from 0-2 where 0 is that he is perfectly okay, 2 is that the person is very much ill and that he needs to consult a doctor.
- Create a Node-RED flow to get data from IBM IoT devices and which will communicate with mobile apps using HTTP requests.
- Create a mobile app through which The person can register along with their name, age, and gender.
- Store the entire data in the Cloudant DB using Node-RED
- Configure the Node-RED to give the sensor input to the ML model and predict the illness of the person.
- Configure the mobile app which will visualize the health parameters and show the suggestions according to the predicted output.

Proposed Technical Architecture:



NODE RED:

Nodes get created when a flow is deployed, they may send and receive some messages whilst the flow is running and they get deleted when the next flow is deployed.

They consist of a pair of files:

- a JavaScript file that defines what the node does,
- an html file that defines the node’s properties, edit dialog and help text.

A `package.json` file is used to package it all together as an npm module

The simplest explanation of Node-Red is that it a way to route messages. Input nodes create a **msg** that has several parts, the nodes in the flow examine this message to decide where to send it next, & this ends in an output that acts on the message. Usually, we are most interested in the **msg.payload**, but that’s not the only information the **msg** carries.

The **call service** Home Assistant node will look for a **data** object in the **msg.payload**. Anything it finds in the data object will be used to override the settings you entered in the call service node. The syntax for this looks like:

```
msg.payload = { "data": {"entity_id":"pulse","temperature" } }
```

Using an inject node, set the msg.payload to JSON and enter the above value. Since we are sending all the information necessary to make the service call, we can just leave the “Data” field blank in the output with a pair of brackets { }.

HealthMonitoring.json file

```
[{"id":"6a27aa49.7043b4","type":"tab","label":"Flow 1","disabled":false,"info":""},{"id":"a05f8d46.3bc2","type":"debug","z":"6a27aa49.7043b4","name":"","active":true,"tosidebar":true,"console":false,"tostatus":false,"complete":"payload","targetType":"msg","statusVal":"","statusType":"auto","x":790,"y":120,"wires":[]},{"id":"ef6f0ac3.83ae18","type":"http request","z":"6a27aa49.7043b4","name":"","method":"POST","ret":"obj","paytoqs":"ignore","url":"https://iam.cloud.ibm.com/identity/token","tls":"","persist":false,"proxy":"","authType":"","x":390,"y":400,"wires":[["b843725f.12958","808cf479.d65da8"]]},{"id":"330f7806.0613b8","type":"function","z":"6a27aa49.7043b4","name":"Pre-tocken","func":"global.set(\"Age\",msg.payload.Age)\nglobal.set(\"Temperature\",msg.payload.Temperature)\nglobal.set(\"Systolic\",msg.payload.Systolic)\nglobal.set(\"Diastolic\",msg.payload.Diastolic)\nglobal.set(\"Pulse\",msg.payload.Pulse)\nvar apikey=\"_TKMQq_Zsv4UYMsPraIvjwEAqWiPgK18LwSofc1uD2WP\";\nmsg.headers={\"
```

content-type\":\"application/x-www-form-urlencoded\"}\nmsg.payload={\"grant_type\":\"urn:ibm:params:oauth:grant-type:apikey\",\"apikey\":apikey}\nreturn msg;\n","outputs":1,"noerr":0,"initialize":"","finalize":"","x":290,"y":300,"wires":[["ef6f0ac3.83ae18"]]},{"id":"b843725f.12958","type":"function","z":"6a27aa49.7043b4","name":"Pre-Prediction","func":"var Age = global.get(\"Age\")\nvar Temperature = global.get(\"Temperature\")\nvar Systolic = global.get(\"Systolic\")\nvar Diastolic = global.get(\"Diastolic\")\nvar Pulse = global.get(\"Pulse\")\nvar token=msg.payload.access_token\nmsg.headers={'Content-Type': 'application/json',\"Authorization\":\"Bearer \"+token,\"Accept\":\"application/json\"}\nmsg.payload={\"input_data\":[{\"fields\": [[\"Age\", \"Temperature\", \"Systolic\", \"Diastolic\", \"Pulse\"]],\"values\": [[Age, Temperature, Systolic, Diastolic, Pulse]]}]}\nreturn msg;","outputs":1,"noerr":0,"initialize":"","finalize":"","x":610,"y":360,"wires":[["3388f6d0.7f51ea"]]},{"id":"808cf479.d65da8","type":"debug","z":"6a27aa49.7043b4","name":"","active":true,"tosidebar":true,"console":false,"tostatus":false,"complete":"payload","targetType":"msg","statusVal":"","statusType":"auto","x":620,"y":500,"wires":[]},{"id":"d4dd45d8.50e228","type":"function","z":"6a27aa49.7043b4","name":"","func":"var Age = global.get ('Age')\nvar Temperature = global.get ('Temperature')\nvar Systolic = global.get ('Systolic')\nvar Diastolic = global.get ('Diastolic')\nvar Pulse = global.get ('Pulse')\nvar output=msg.payload.predictions[0].values[0][0]\nglobal.set(\"ouptut\",output)\nmsg.payload = {\n details: {\n health: {\n Age: Age,\n temperature: Temperature,\n systolic: Systolic,\n diastloic:Diastolic,\n pulse: Pulse,\n output: output\n }\n }\n}\nreturn msg;\n","outputs":1,"noerr":0,"initialize":"","finalize":"","x":730,"y":280,"wires":[["144b51ec.bfdd2e","65d335a4.ed5dac"]]},{"id":"3388f6d0.7f51ea","type":"http request","z":"6a27aa49.7043b4","name":"","method":"POST","ret":"obj","paytoqs":"ignore","url":"https://us-south.ml.cloud.ibm.com/ml/v4/deployments/c4e07c0f-3c34-4137-86f2-e4731e2c3dba/predictions?version=2020-09-01","tls":"","persist":false,"proxy":"","authType":"","x":780,"y":420,"wires":[["d4dd45d8.50e228","847200c6.cb0ee"]]},{"id":"847200c6.cb0ee","type":"debug","z":"6a27aa49.7043b4","name":"","active":true,"tosidebar":true,"console":false,"tostatus":false,"complete":"payload","targetType":"msg","statusVal":"","statusType":"auto","x":950,"y":500,"wires":[]},{"id":"65d335a4.ed5dac","type":"debug","z":"6a27aa49.7043b4","name":"","active":true,"tosidebar":true,"console":false,"tostatus":false,"complete":"payload","targetType":"msg","statusVal":"","statusType":"auto","x":950,"y":300,"wires":[]},{"id":"144b51ec.bfdd2e","type":"ui_text","z":"6a27aa49.7043b4","group":"57e20c90.082ae4","order":6,"width":"17","height":"2","name":"","label":"Status","format":"{{msg.payload}}","layout":"row-spread","x":930,"y":220,"wires":[]},{"id":"1cf8af4d.459b11","type":"inject","z":"6a27aa49.7043b4","name":"","props":[{"p":"payload"},{"p":"topic","vt":"str"}],"repeat":"","crontab":"","once":false,"o

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tle":"Systolic","label":"units","format":"{{msg.payload.Systolic}}","min":0,"max":"200","colors
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,"order":4,"width":"6","height":"6","gtype":"gage","title":"Age","label":"","format":"{{msg.payloa
d.Age}}","min":0,"max":"80","colors":["#00b500","#e6e600","#ca3838"],"seg1":"","seg2":"","x":
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icalInterfaces":"","allEvents":true,"allCommands":"","allFormats":"","qos":0,"x":220,"y":160,"wi
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tofthings.ibmcloud.com","cleansession":true,"appId":"","shared":false},{"id":"bc59ffed.a4e5
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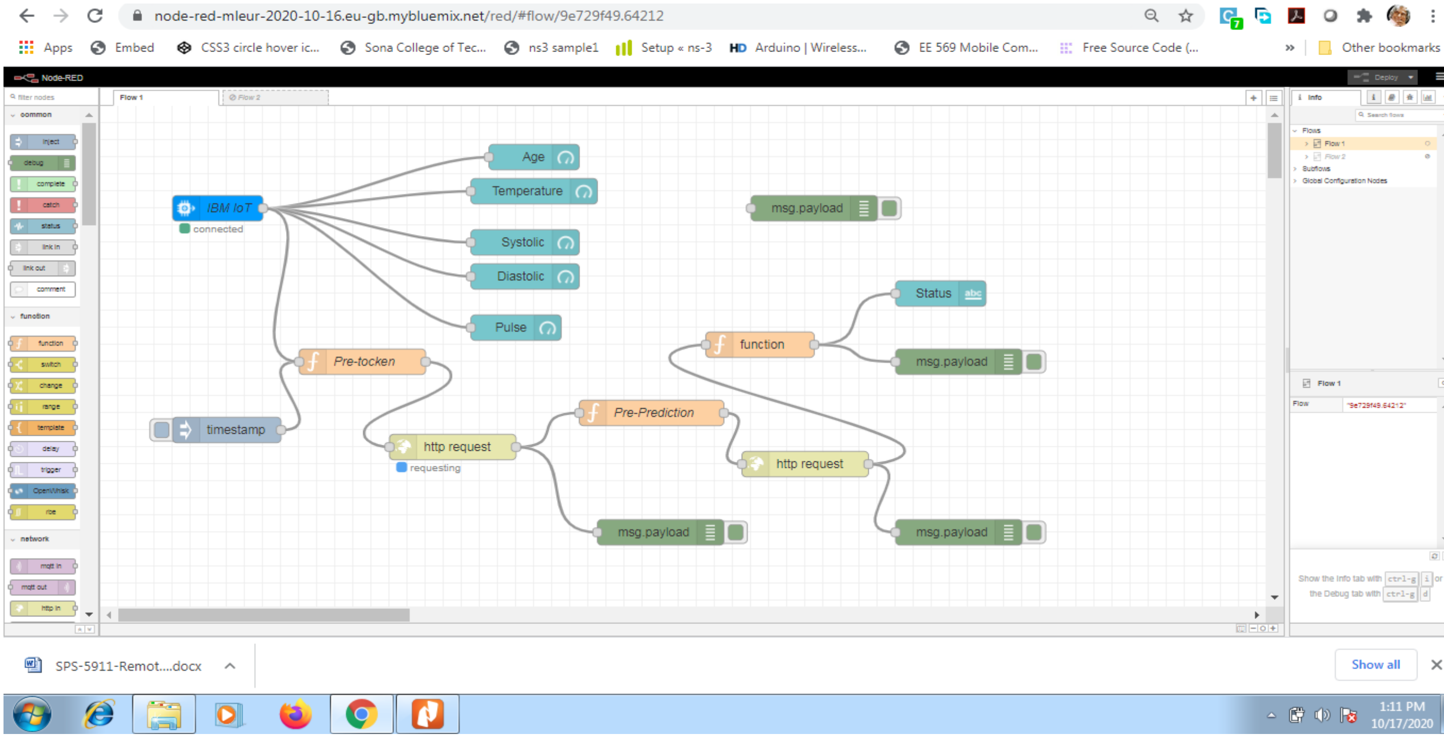
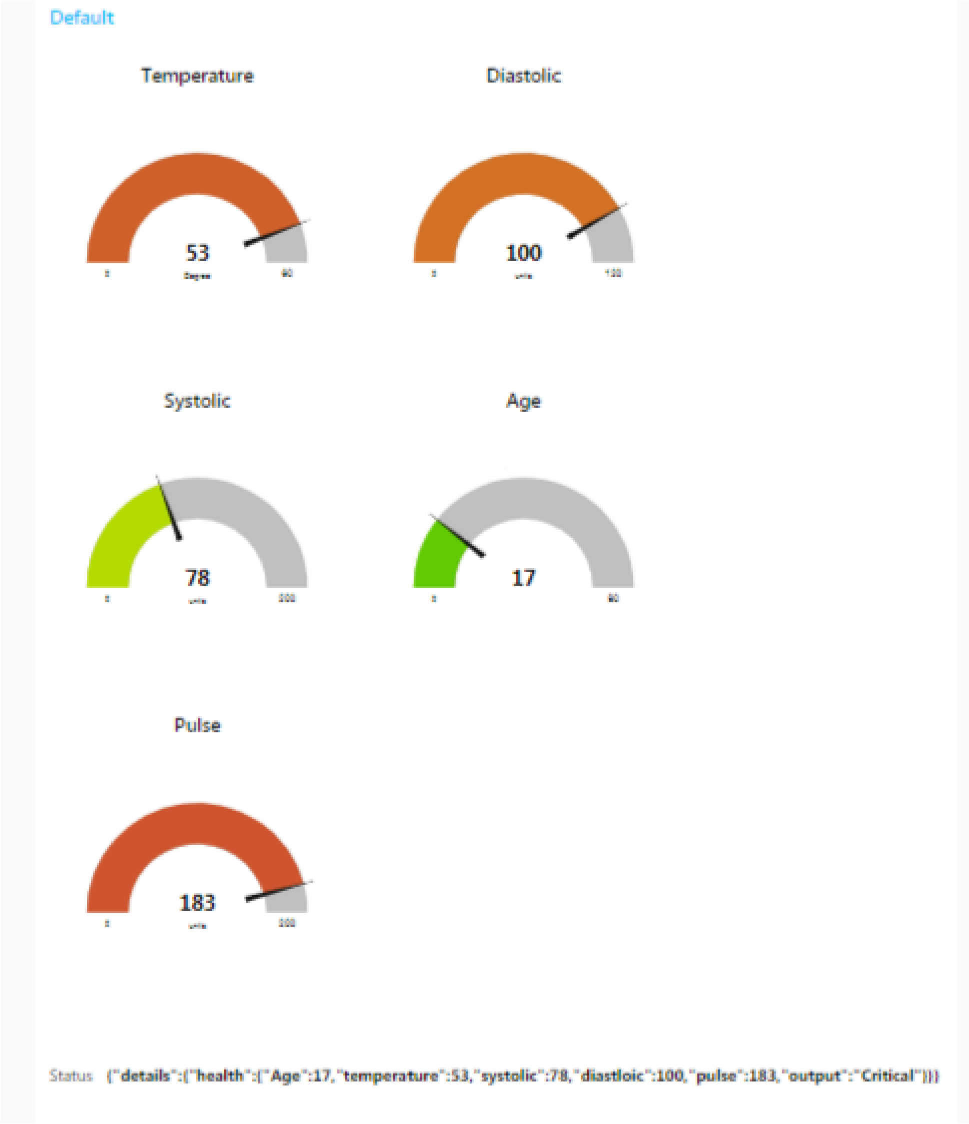
monitor","icon":"dashboard","disabled":false,"hidden":false}]
```



Output Screen



```
Status  {"details":{"health":{"Age":17,"temperature":53,"systolic":78,"diastloic":100,"pulse":183,"output":"Critical"}}}
```

Conclusion

The project started out with the goals of developing a Remote health monitoring system that would be easy to install and reliable for use in live video applications. While time-to-health and budget constraints prevented the team from successfully implementing a market-ready product, most of the overall design concepts can be directly incorporated into a commercial product. In this Health monitoring system we will be detecting the level of ill health of the person and would recommend few medications that can be taken by him by which he can recover a bit than before using Machine learning and Internet of things.