Programming Assignment: End-to-end scenario

You have not submitted. You must earn 1/1 points to pass.

Deadline Pass this assignment by August 14, 11:59 PM PDT

Instructions

My submission

Discussions

Assignment goals

This assignment will create a NodeRED application on both the Raspberry Pi and on Bluemix to create an end-to-end scenario. You will send temperature data from the Raspberry Pi and SenseHAT to a cloud based application where it is analysed. The cloud application will send a command back to the device if the temperature rises above, or falls below a pre-set limit. The Raspberry Pi will display the current temperature status, based on the latest cloud application command and also the current temperature from the SenseHAT temperature sensor.

Part 1 - Register your Raspberry Pi as a gateway

This assignment will use the Raspberry Pi as a gateway, publishing data on behalf of a sensor and also publishing gateway data.

To accomplish this you will:

- delete the registration of the Pi in your Watson IoT Platform organization,
- create a new gateway type for your raspberry Pi then register your Pi as a gateway
- use the SenseHAT as the remote sensor, so need to create a device type and register the senseHAT

Part 2 - Publish temperature data

Publish the senseHAT temperature and humidity every 5 seconds. The CPU temperature of the Raspberry Pi should also be published to the Watson IoT organization every 5 seconds, but for the gateway, not the sensor device.

Part 3 - Bluemix application to respond to the temperature data

Create a Bluemix application to:

- receive the SenseHAT data
- check to see if the senseHAT device data is above or below a specified temperature (29ºC). If the temperature rises above the specified temperature then send a command to the device to turn a warning LED on, if the temperature is below the specified temperature then send a command to turn the warning LED off. The command should only be sent when the temperature rises to or falls below the specified temperature - not every time data is received from the device. The temperature data from the gateways and the sensors should be output to the debug tab in Bluemix UI.

Part 4 - Update the SenseHAT LED panel

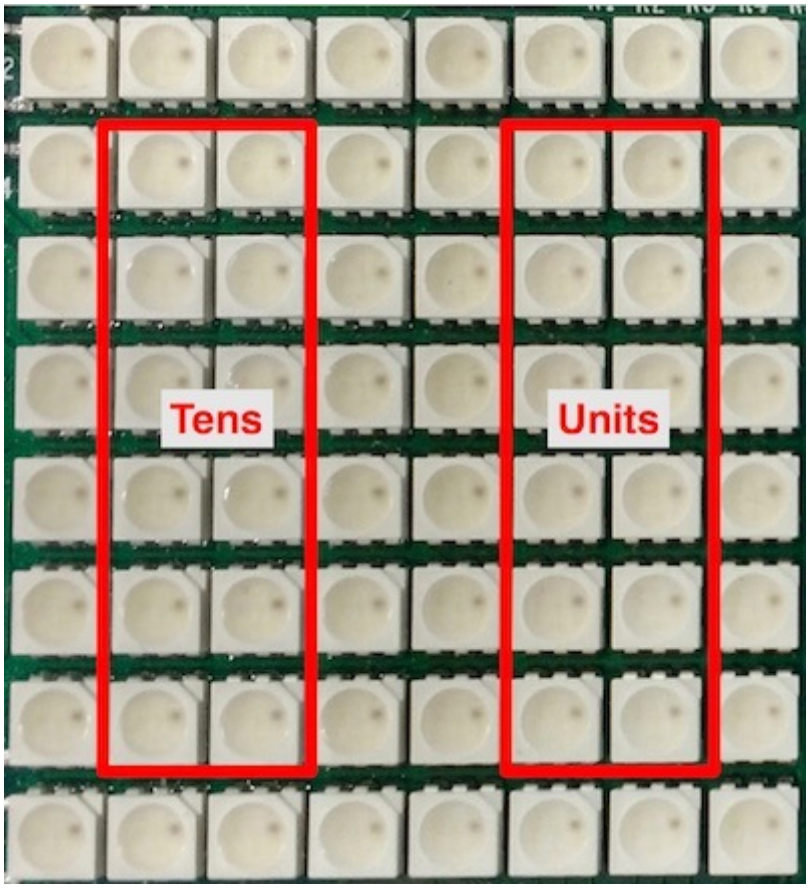
On the device update the NodeRED application to receive the command. The LED panel on the SenseHAT should then be used to display appropriate data:

- If the command to turn the warning LED on is received the entire display should be set to maroon (#800000)
- If the command to turn the warning LED off is received the entire display should be set to green (#008000)
- if no command has yet been received the LED panel should be black (off / #000000)

In addition to the color being set above the LED panel should also display the current temperature being reported by the senseHAT by overlaying the temperature data over the background colour:

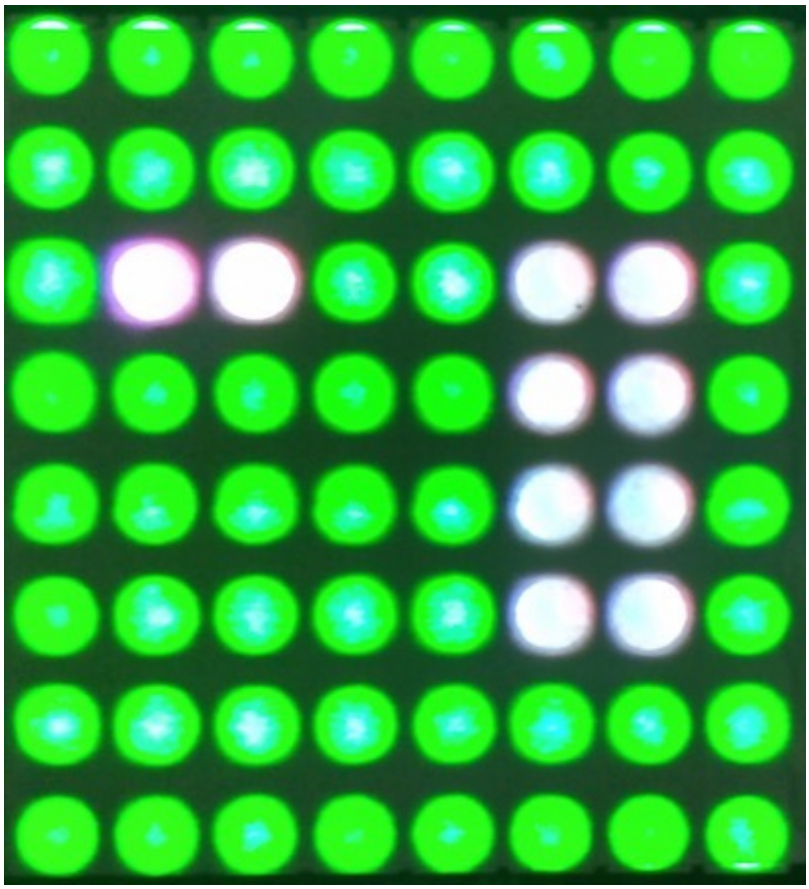
- take the temperature and round down to nearest integer (29.9 = 29)
- 10s part of the temperature should be displayed in columns 2 and 3 of the LED panel in rows 2-7
- units part of the temperature should be displayed in columns 6 and 7 of the LED panel in rows 2-7
- Represent the value by turning the appropriate number of LEDs to silver (#C0C0C0). If the value for a section is 0 then no LEDs should be silver, so for 30 there should be 3 LEDs in the Tens section showing silver but no LEDs in the

Units section showing silver.

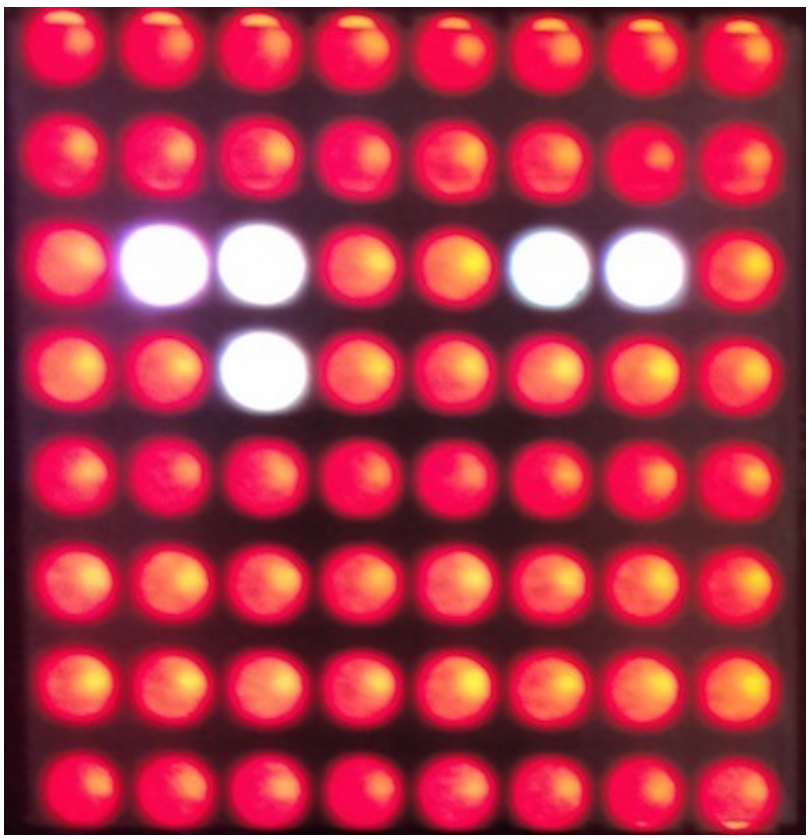


NOTE: column 2 is the second column, but its coordinate is 1 as the grid starts at 0. The same applies to rows.

28°C =



32°C =



- You can light any of the LEDs in each region, so long as the correct number are set to silver to represent the value. Those LEDs not silver should be the appropriate color as defined above for when a command is received

NOTE: You need to combine setting the LED values for the background colour AND the temperature value into a single operation. Only setting the background colour when a command is received and only setting the temperature when the senseHAT sends a new reading is not a valid solution. Your solution to set the LED values must use the last command received (if one has been received) AND the latest temperature value from the SenseHAT and the display should be updated each time a command is received or the senseHAT sends a new temperature reading.

How to complete the assignment

SenseHAT deviceID = Raspberry Pi ID with 'sen" prepended.

The command sent to the device should have a command id/type of ‘display’ and be formatted as a JSON object with a single property called ‘screen’ with a value of either ‘on’ or ‘off’. For example: {“screen”:”on”}. It must not include the temperature value

Publish the CPU temperature data using the message format {'d' : {'temp' : <CPU temperature>}}. The value returned from the vcgencmd should replace <CPU temperature> and should be a number not a string in the object published to the Watson IoT Cloud. As the SenseHAT sends a message every second, you must change the rate of messages to once every 5 seconds. This can be accomplished using the Delay node set to its rate-limiting mode.

Publish the SenseHAT temperature and humidity data using the message format {'d':{'temperature':<SenseHat temperature>,'humidity':<SenseHat humidity>}}, with the appropriate values received from the SenseHat. The values should be a number and not a string.

The display must be updated whenever a new sensor reading is received from the SenseHAT, or when a command is received from Watson IoT Cloud. The update must combine the most recently received command and temperature as described above.

What to submit

When you have the flows completed you should select all the nodes on the Raspberry Pi then export the flow to your clipboard. Open a text editor and copy the flow then save as a text file named assignment5.txt. Submit the text file containing your flow

How to submit

When you're ready to submit, you can upload files for each part of the assignment on the "My submission" tab.