

# IBM / ST SensorTile Watson IoT Workshop

Connect the ST Microelectronics SensorTile to IBM Watson IoT

Download this PDF and Node-RED flows at

<https://github.com/johnwalicki/SensorTile-WatsonIoT-Workshop>

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# Getting Started with Watson IoT Platform

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This workshop details the Developer experience using the ST Microelectronics SensorTile and IBM Watson IoT Platform. You will create an IBM Bluemix IoT Cloud Foundry application that displays and analyzes ST Micro SensorTile sensor data using Quickstart and Node-RED.

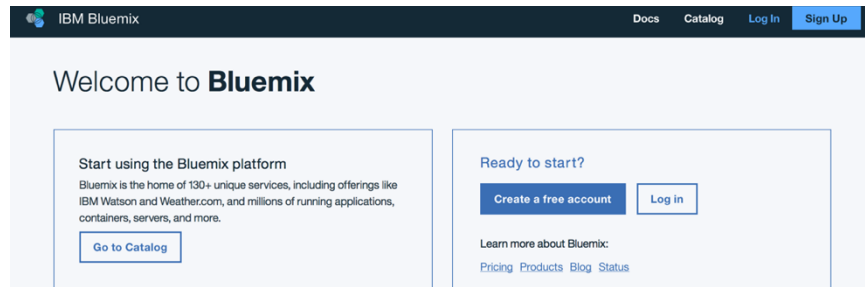
In this workshop, we will connect a ST Microelectronics SensorTile device to IBM Bluemix and Watson IoT Platform. We will send and graph temperature and gesture data to the Watson IoT Quickstart and registered devices. Watson IoT Platform will report the SensorTile gesture events in a Node-RED Dashboard.

# Section 1 – Create a Bluemix Trial Account

In this Section, we will create a free trial account on Bluemix.

## Step 1 – Register for a Free Trial Account on Bluemix

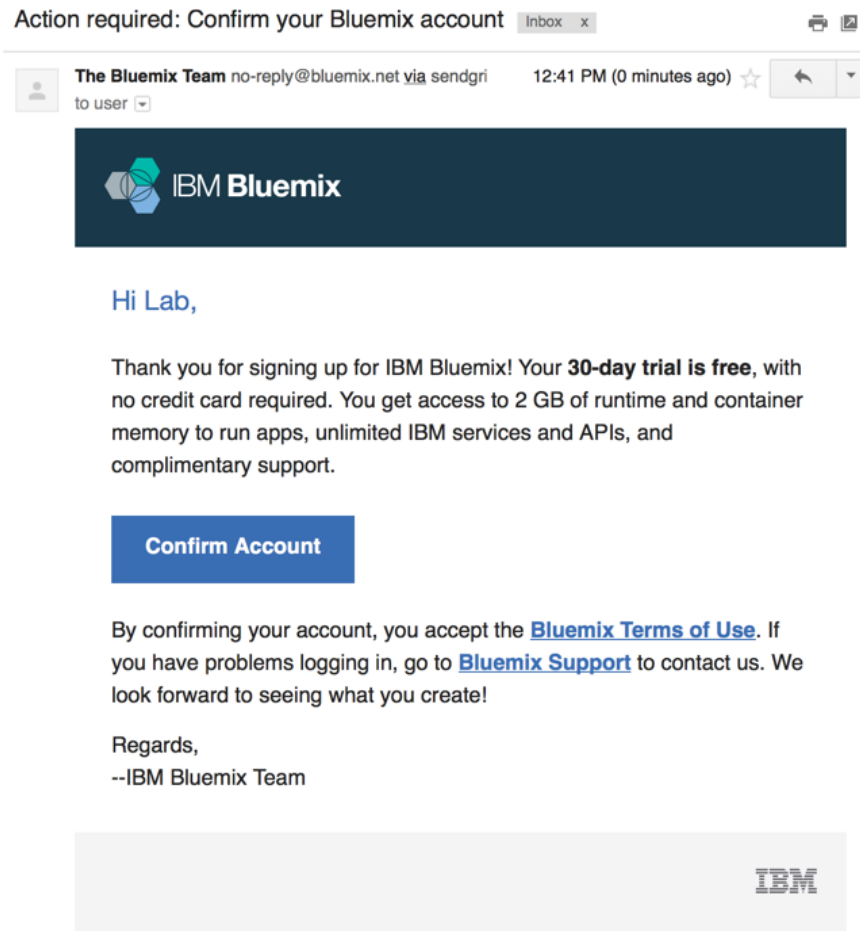
- In a new browser tab, goto <http://bluemix.net> and click “Create a free account”



- Enter your email, name, phone number and password and click “Create account”

The screenshot displays the account creation form on the Bluemix website. The left side of the form is a blue sidebar with white text that reads: 'Sign up for an IBMid and create your Bluemix account', 'Try Bluemix free for 30 days', 'Start building immediately.', 'Your trial doesn't require a credit card. All you need to do is sign up and start building.', 'Production app? No problem.', 'We give you 2GB of runtime and container memory free for 30 days, plus access to provision up to 10 services.', and 'We're here to help. Your trial comes with free help desk support. Ask us anything along the way.' The right side of the form is white and contains the following fields: 'Email\*' (with 'user@clouddragons.com' entered and a green checkmark), 'First Name\*', 'Last Name\*', 'Company', 'Country or Region\*' (a dropdown menu showing 'United States'), 'Phone Number\*', 'Password\*', and 'Re-enter Password\*'. At the bottom, there is a checkbox for 'Keep me informed of products, services, and offerings from IBM companies worldwide.' with options for 'By email' and 'By telephone'. A line of text states: 'By clicking Create Account, I accept the Bluemix privacy policy and Bluemix terms.' Below this is a blue 'Create Account' button.

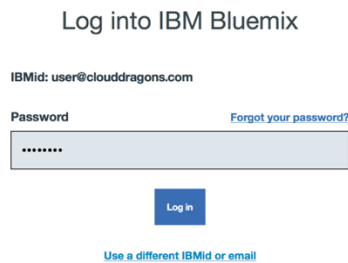
- Check your email and click the “Confirm Account” button.



- Ensure that the resulting screen says “Success!” and log into Bluemix



- Log In to Bluemix



- Create an organization with the same name as your email

Docs | IBM Bluemix Apps | Lab Instructor's Account | US South | Catalog | Support | Account

### Create organization

Before you start using Bluemix, you need to set up your environment.

To start, name your first organization. Think of an org as a project or team that shares resources, such as apps, databases, and other services. Orgs exist in geographic regions, so decide where you'd like to put your first one.

US South | user@clouddragons.com | Create

NEED SOME SUGGESTIONS? TRY THESE

user | user@clouddragons.com

LOG OUT | SUPPORT

- Create a space

Docs | IBM Bluemix Apps | Lab Instructor's Account | US South | Catalog | Support | Account

### Create space

Now, let's get you set up with a space.

Spaces help you manage access and permissions for a set of resources, and map nicely to development stages like dev, test, and prod. Name your first space now—you can add more spaces later.

Org name: user@clouddragons.com

dev | Create

NEED SOME SUGGESTIONS? TRY THESE

dev | test | prod

LOG OUT | SUPPORT

- Click “I'm Ready”

Docs | IBM Bluemix Apps | Lab Instructor's Account | US South | user@clouddragons.com | dev | Catalog | Support | Account

### Summary

Good to Go!

You're up and running with your first org and space. Are you ready to get started with Bluemix?

Org name: user@clouddragons.com

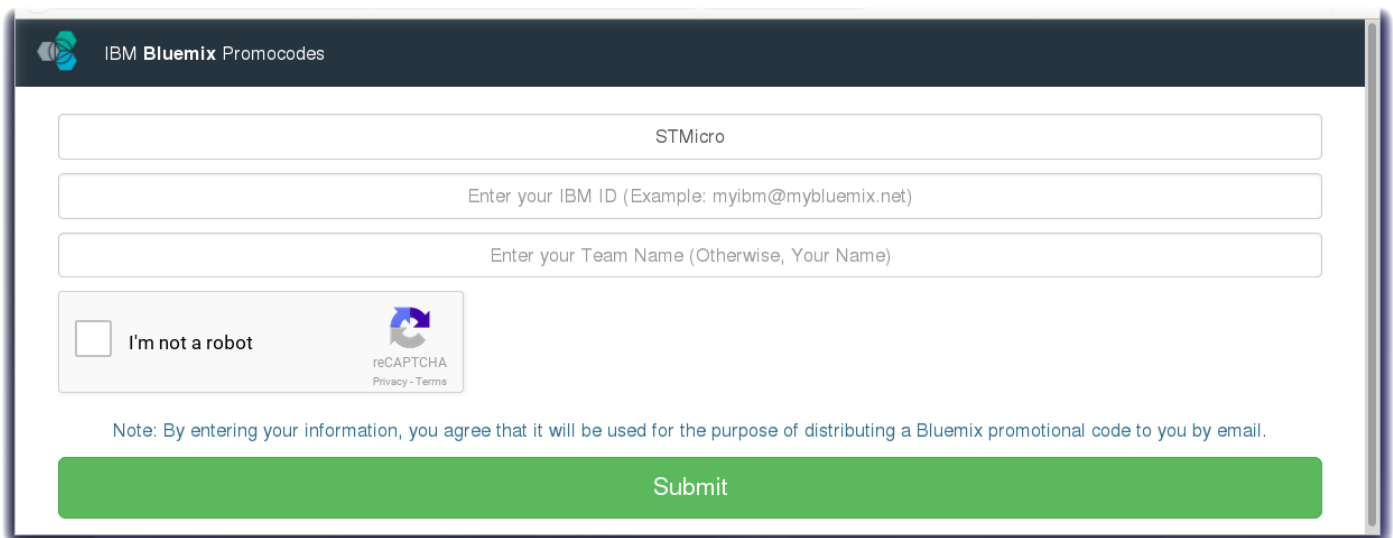
Space name: dev

I'm Ready

LOG OUT | SUPPORT

## Step 2 – Get a Promocode to extend your Bluemix Trial Account

- Workshop attendees can apply a Promocode to their Bluemix account and extend the duration of the Trial period, add additional Services and increase the memory of your Bluemix Cloud Foundry applications.
- Visit <http://promocodes.mybluemix.net>
- Enter **STMicro** as the Event Name (Case sensitive)



The screenshot shows the 'IBM Bluemix Promocodes' web form. It has a dark header with the IBM logo and the text 'IBM Bluemix Promocodes'. Below the header are three input fields: the first contains 'STMicro', the second is labeled 'Enter your IBM ID (Example: myibm@mybluemix.net)', and the third is labeled 'Enter your Team Name (Otherwise, Your Name)'. Below these fields is a reCAPTCHA section with a checkbox labeled 'I'm not a robot' and the reCAPTCHA logo. A note below the reCAPTCHA states: 'Note: By entering your information, you agree that it will be used for the purpose of distributing a Bluemix promotional code to you by email.' At the bottom is a large green 'Submit' button.

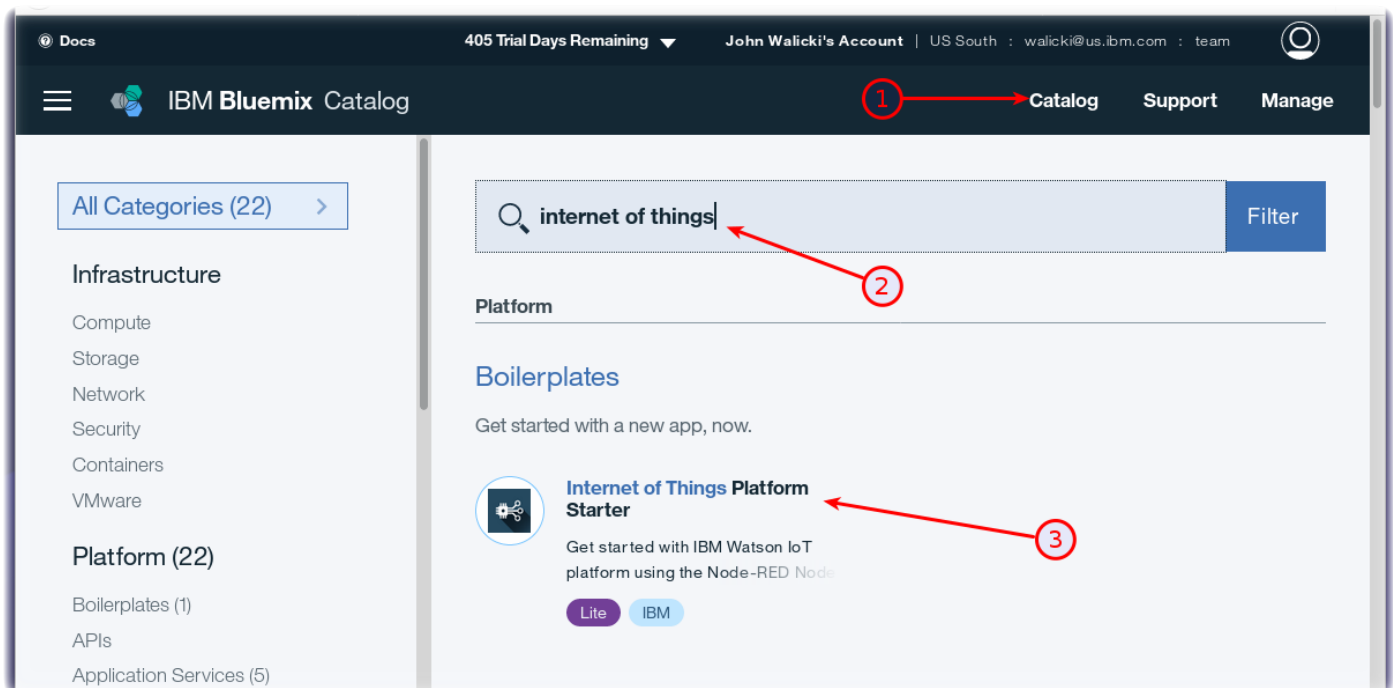
- Enter your Bluemix email address / IBM ID and your name.
- Check that you are not a robot and press the Submit button.
- Check your email for the Bluemix Promocode.
- Follow the instructions to apply the Promocode to your account.

## Section 2 – Create an Internet of Things Starter App

### Step 1 – Create an IoT Starter Application

Earlier in the workshop we sent the ST Microelectronics SensorTile data to Watson IoT Quickstart, in this Section we will create a Bluemix Cloud Foundry IoT Starter Application to ingest and analyze the Quickstart data.

- Click on the **Catalog** (1) and search for '**internet of things**' (2)
- The **Internet of Things Platform Starter** (3) boilerplate is a pattern with pre-assembled services that work together. The Internet of Things Platform Starter includes a Node-RED Node.js web server, Cloudant database to store the sensor data, and the IoT platform service so you can connect devices.



- Name your application something unique. If you choose **myapp**, your application will be located at <http://myapp.mybluemix.net>. There can only be one “myapp” application and URL registered in IBM Bluemix.

- Give the application a unique name (4) - eg. **sensortile-yourname**

IBM Bluemix Catalog

## Create a Cloud Foundry App

Internet of Things Platform Starter

Get started with IBM Watson IoT platform using the Node-RED Node.js sample application. With the Starter, you can quickly simulate an Internet of Things device, create cards, generate data, and begin analyzing and displaying data in the Watson IoT Platform dashboard.

Lite IBM

[View Docs](#)

VERSION 0.7.0  
TYPE Boilerplate  
REGION US South, Germany, United Kingdom

App name:

Host name:

Domain:

Select region to deploy in:

Choose an organization:

Choose a space:

Selected Plan:

SDK for Node.js™

Cloudant NoSQL DB

Internet of Things Platform

Need Help? [Contact Bluemix Sales](#)

Estimate Monthly Cost [Cost Calculator](#)

[Create](#)

- Press the **Create** button (5).
- IBM Bluemix will create an application in your account based on the services in the boilerplate. This is called staging an application. It can take a few minutes for this process to complete. While you wait, you can click on the **Logs** tab and see activity logs from the platform and Node.js runtime.

## Step 2 - Launch the IoT Starter Application

- Once the Green **“Running”** icon appears, Click the **Visit App URL** link (6).

IBM Bluemix Cloud Foundry Apps

Cloud Foundry apps / sensortile-walicki

Running [Visit App URL](#)

[Routes](#) [Refresh](#) [Stop](#) [More](#)

### Getting started with Watson IoT Platform Starter

Last Updated: 2017-01-30 | [Edit in GitHub](#)

Get started with IBM Watson™ IoT Platform by using the Watson IoT Platform Starter boilerplate. By using the Starter, you can quickly simulate a device, create cards, generate data, and begin analyzing and displaying data in the Watson IoT Platform dashboard.

The Starter automatically deploys and connects these services:

- **Watson IoT Platform** - An IoT toolkit that includes gateway management, device management, and application access. By using Watson IoT Platform, you can collect connected device data and run analytics on real-time data from your organization.
- **IBM® SDK for Node.js for Bluemix®** - The runtime environment in which Node-RED runs.
- **IBM® Cloudant® NoSQL DB for Bluemix®** - The database in which Node-RED stores metadata.
- **Node-RED application** - An instance of the Node-RED application that includes nodes designed for Watson IoT Platform.



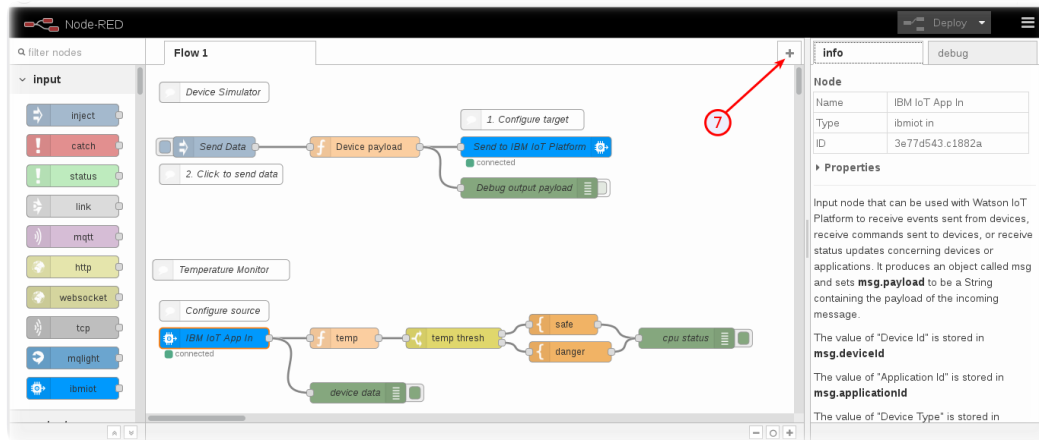
## Step 3 – Open the Node-RED visual programming editor

- A new browser tab will open to the Node-RED start page. Node-RED is an open-source Node.js application that provides a visual programming editor that makes it easy to wire together flows. Select a username / password to access the Node-RED editor. Remember your username / password. Click the red button **Go to your Node-RED flow editor** to launch the editor.

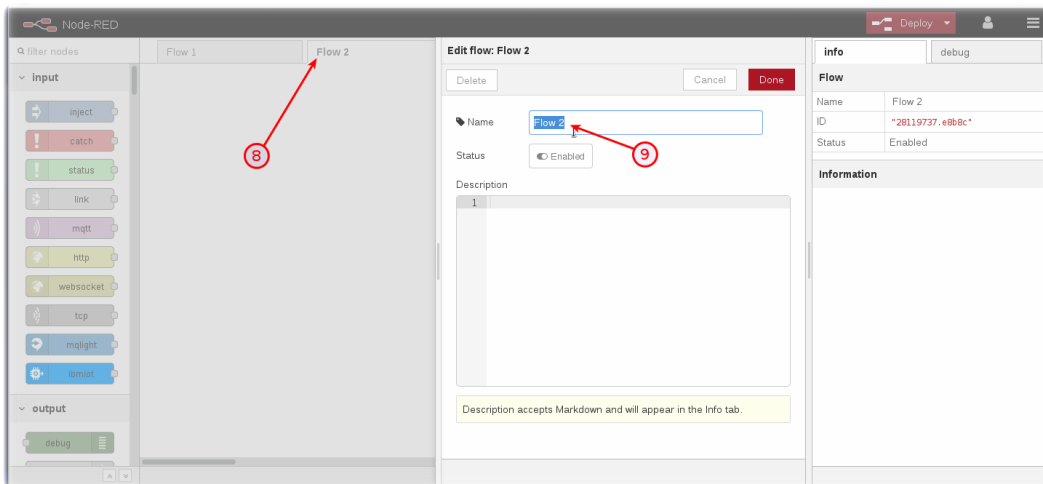
The screenshots show the following steps of the Node-RED setup wizard:

- Welcome to your Internet of Things Platform (IoT) boilerplate application on IBM Bluemix**: This screen introduces the application and lists the tasks to be completed, including "Secure your Node-RED editor".
- Secure your Node-RED editor**: This screen allows the user to configure security. The first option is "Secure your editor so only authorised users can access it", which includes fields for "Username" and "Password" (with a note "Must be at least 8 characters"). A second option is "Allow anyone to view the editor, but not make any changes". A third option is "Not recommended: Allow anyone to access the editor and make changes".
- Finish the configuration**: This screen summarizes the selections made by the user. It lists the selected security option and provides instructions on how to override settings using environment variables: `NODE_RED_USERNAME` (the username), `NODE_RED_PASSWORD` (the password), and `NODE_RED_GUEST_ACCESS` (if set to 'true', allows anyone read-only access to the editor).
- Node-RED on IBM Bluemix for IBM Watson IoT Platform**: This is the final screen, which displays the Node-RED logo and the text "Flow-based programming for the Internet of Things". It includes a prominent red button labeled "Go to your Node-RED flow editor" and a link to "Learn how to customise Node-RED".

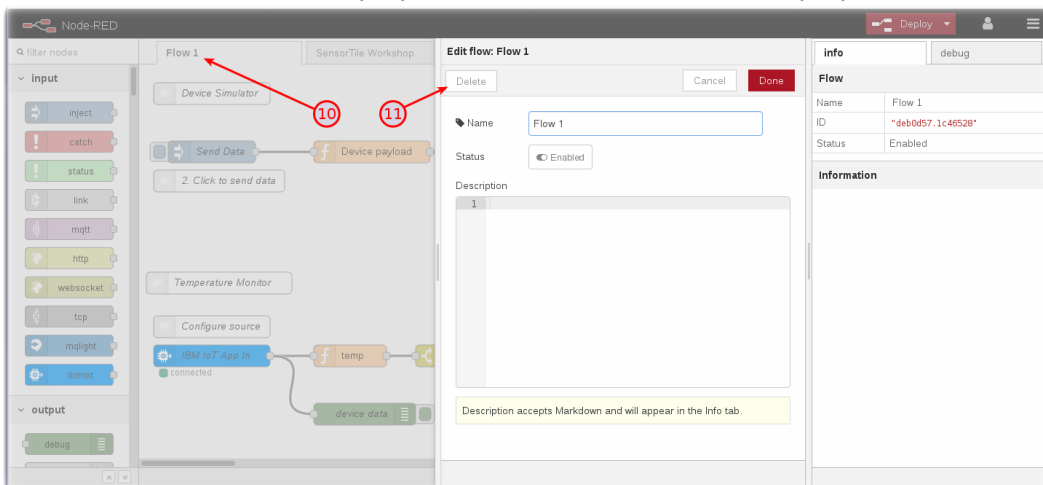
- The Node-RED Visual Programming Editor will open with a default flow.
- On the left side is a palette of nodes that you can drag onto the flow.
- You can wire nodes together to create a program.
- The sample IoT Starter flow is not applicable to this workshop and can be deleted.



- Click the **+** icon (7) to add a new tab. Click on the **Flow 2** tab header (8).
- Rename this tab from **Flow 2** to **SensorTile with Quickstart** (9)



- Click on the **Flow 1** tab header (10). Press the **Delete** button. (11)

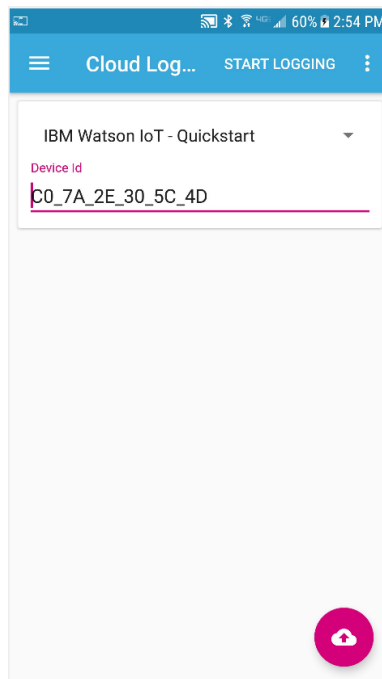
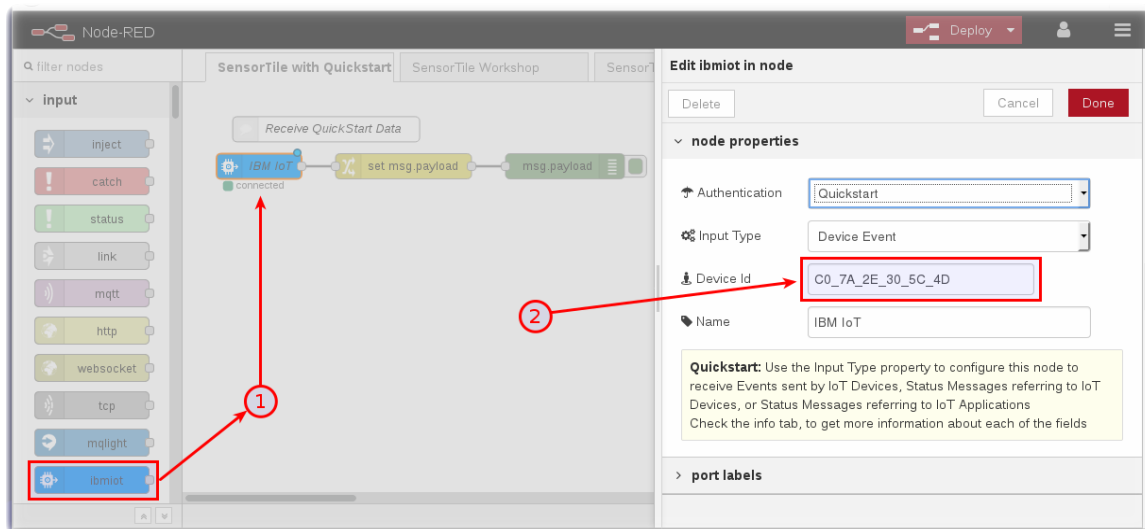


## Section 3: Receive SensorTile data sent to QuickStart

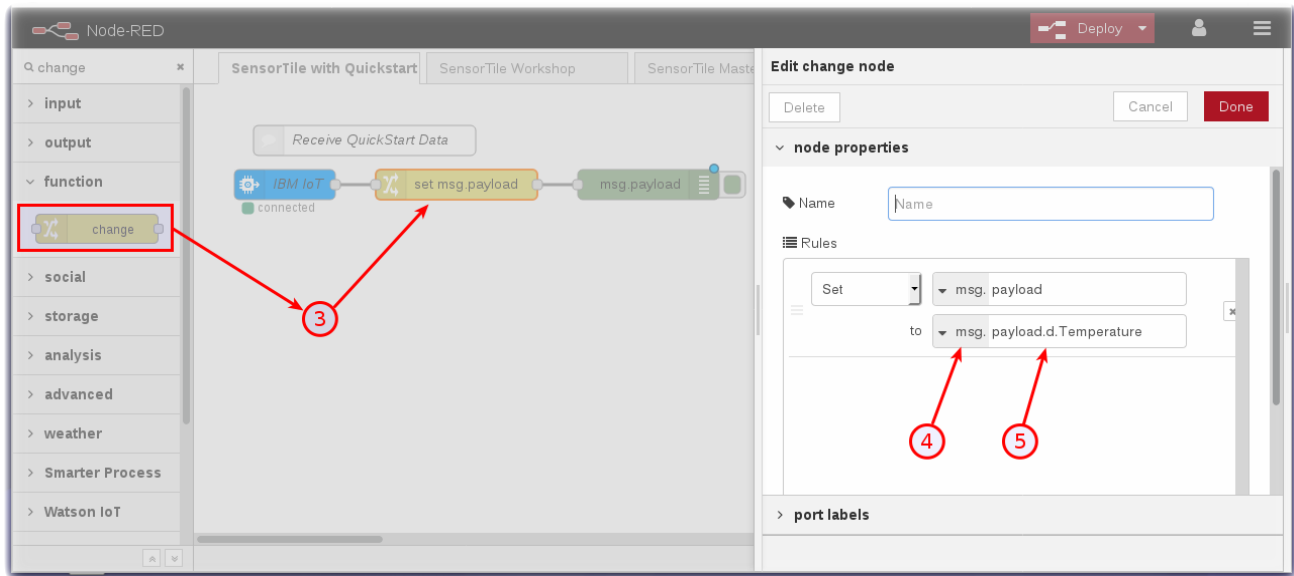
### Step 1 – Receive SensorTile data sent to Quickstart

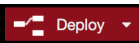
Earlier in the workshop we sent the ST Microelectronics SensorTile data over Bluetooth to your mobile phone and then used the ST BlueMS mobile app to send the data to Watson IoT Quickstart. In this Section we will use the IoT Starter Application we just created to ingest and display the Quickstart data.

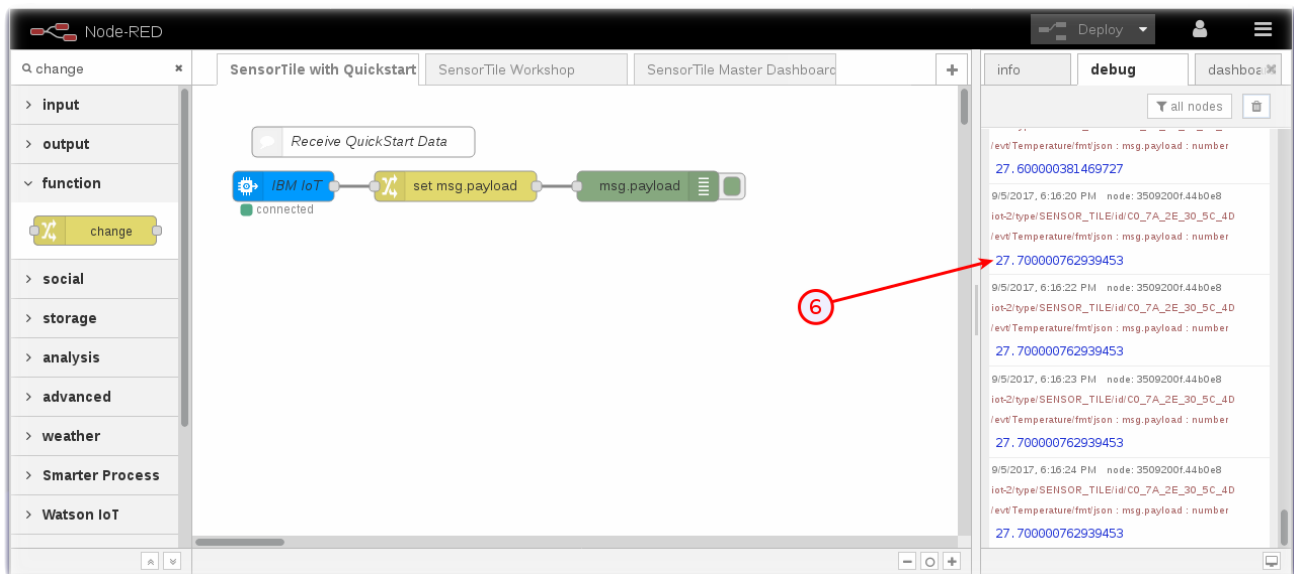
- In the **input** category of your Node-RED palette, find the **ibmiot node** and drag it onto your flow (1)
- Double click on the **IBM IoT in** node and configure the node with your SensorTile **Device Id** (2) You can find the Device Id in the ST BlueMS mobile application if you do not remember it.
- Click on the **Done** button.



- In the **function** category of your Node-RED palette, find the **change node** and drag it onto your flow (3).
- Double click on the **change** node and configure the Rules by clicking on the “a/z” dropdown and select **msg**. (4) Type in **payload.d.Temperature** (5)



- Click on the **Done** button.
- In the **output** category of your Node-RED palette, find the **debug** node and drag it onto your flow.
- Wire the three nodes together as shown.
- Click the Deploy  button on the top of menu bar to deploy the Node-RED flow.
- Turn to the **debug tab** on the right sidebar of your Node-RED flow.
- You should observe Quickstart Temperature data (6) arriving from the SensorTile and the ST BlueMS application.



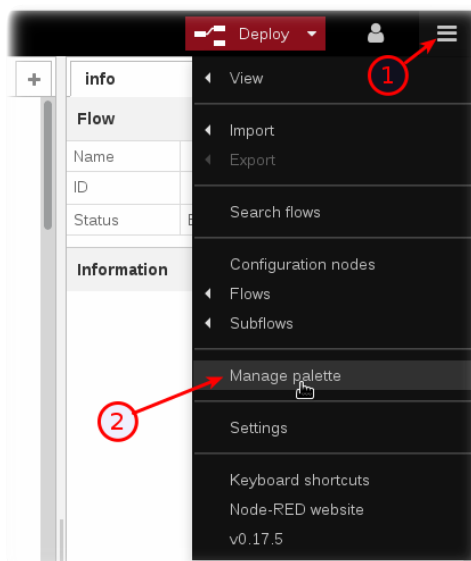
## Section 4: Create a Watson IoT Node-RED Dashboard

In this Section, we will create a Node-RED Dashboard to visualize the SensorTile sensor data. Instead of ingesting publically viewable Watson IoT Quickstart data, we will switch to more secure Watson IoT Platform registered Device Types and Device Ids. We will modify the ST Microelectronics ST BlueMS mobile application to send data using registered device types and authorization tokens.

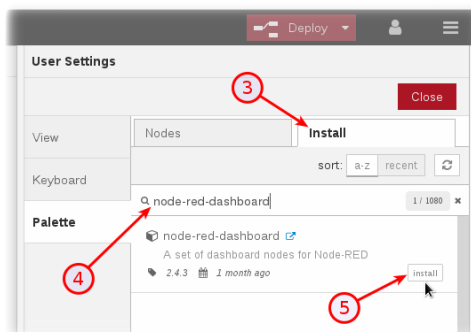
### Step 1 – Install the Node-RED Dashboard nodes

The IoT Starter Application deployed into Bluemix includes just a small subset of Node-RED nodes. The Node-RED palette can be extended with over one thousand additional nodes for different devices and functionality. These NPM nodes can be browsed at **<http://flows.nodered.org>**

- In this Step, you will add the **Node-RED Dashboard** nodes to your Internet of Things Starter Application.



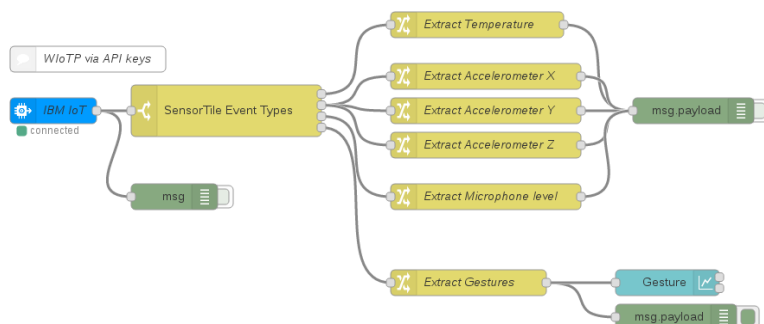
- Click on the Node-RED **Menu** (1) in the upper right corner, then **Manage palette** (2)
- Turn to the **Install** tab (3), type **node-red-dashboard** (4) and press the **Install** button (5).



- Press the **Install** button in the next dialog.

## Step 2 – Import a prebuilt flow from GitHub

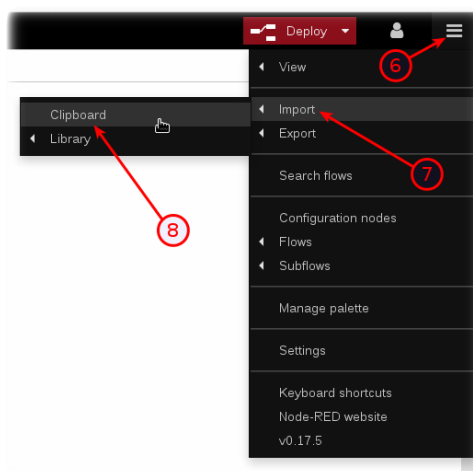
- Since configuring Node-RED nodes and wiring them together requires many steps to document in screenshots, there is an easier way to build a flow by importing a prebuilt flow into your IoT Starter Application.



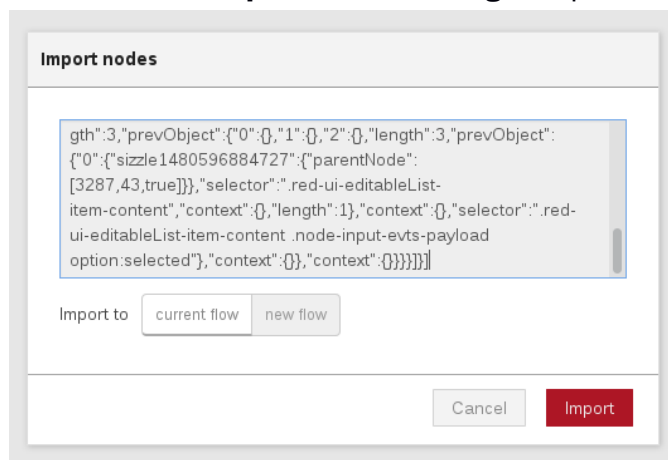
### Get the Code:

<http://ibm.biz/sensortile-nodered>

- Open the **“Get the Code”** github URL listed above, mark or Ctrl-A to select all of the text, and copy the text for the flow to your Clipboard.
- Click on the Node-RED Menu (6), then **Import** (7), then **Clipboard** (8).



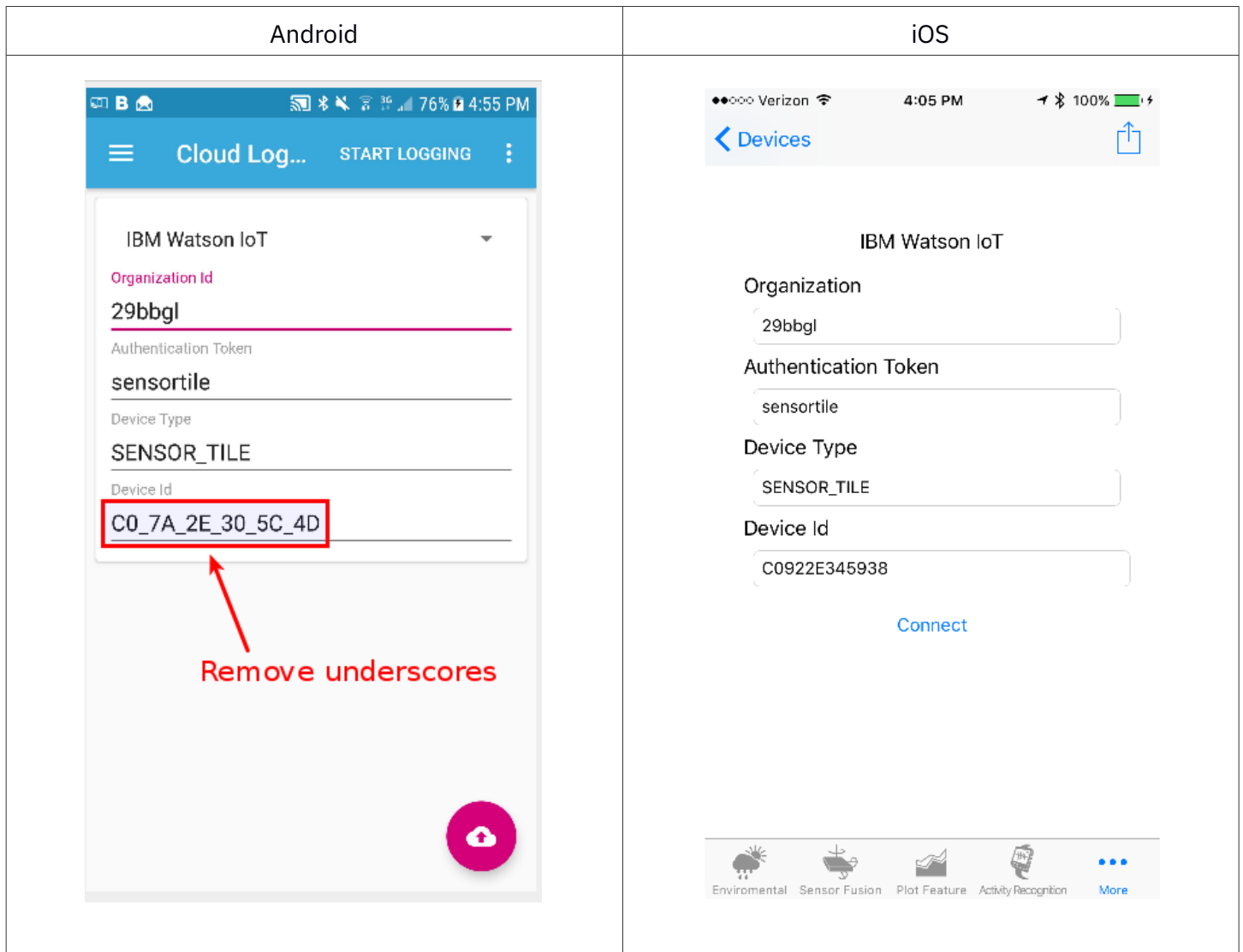
- Paste the text of the flow into the **Import nodes** dialog and press the red **Import** button.



- The new flow will be imported into a **SensorTile Workshop** tab.

### Step 3 – Configure the ST BlueMS Mobile Application to send data to Watson IoT

- To speed the limited time allocated to the workshop, all of the SensorTile Device Ids have been pre-registered into a single Watson IoT Platform instance. Normally, you would step through the Watson IoT Device Type and Device Id creation steps to register your SensorTiles.
- Open the ST BlueMS Mobile Application, connect to your SensorTile and turn to the **Cloud Logging** menu. Choose the **IBM Watson IoT** option from the dropdown.
- Enter **29bbgl** for the **Organization Id**
- Enter **sensortile** (in lowercase) as the **Authentication Token**
- The **Device Type** should already be prefilled with **SENSOR\_TILE** (uppercase).
- The **Device Id** should already be prefilled with the MAC address of your SensorTile.  
**REMOVE any \_ underscores from the Device Id**



- Press the **Connect** icon (Android) or **Connect** (iOS).

## Step 4 – Connect your SensorTile to your IoT Starter Node-RED application

- Click on the **ibmiot** in node (1) and the configuration panel will open. The SensorTile Device Ids have been pre-registered into a single Watson IoT Platform instance. You will use an API Key and API Token to receive your SensorTile data into your IoT Starter application.
- The ibmiot Authentication property should be set to **API Key** (2)
- The ST BlueMS mobile application provided your individual **SensorTile Device Id**. (4) Enter the Device Id (without \_ underscores!)

The screenshot shows the Node-RED web interface. On the left, the 'input' category is expanded, showing various nodes including 'ibmiot'. A red circle with the number '1' points to the 'ibmiot' node. In the center workspace, a flow is visible with a 'WIoT via API keys' node connected to a 'SensorTile Event Types' node, which is then connected to a 'msg' node. A red circle with the number '2' points to the 'ibmiot' node in the left sidebar. On the right, the 'Edit ibmiot in node' configuration panel is open. It shows various properties for the 'ibmiot' node. A red circle with the number '3' points to the 'API Key' field, which is currently set to 'API Key'. A red circle with the number '4' points to the 'Device Id' field, which contains the value 'C07A2E305C4D'. Below the configuration panel, there is a yellow information box with text: 'Use the Input Type property to configure this node to receive Events sent by IoT Devices, Commands sent to IoT Devices, Status Messages referring to IoT Devices, or Status Messages referring to IoT Applications. Check the info tab, to get more information about each of the fields'.

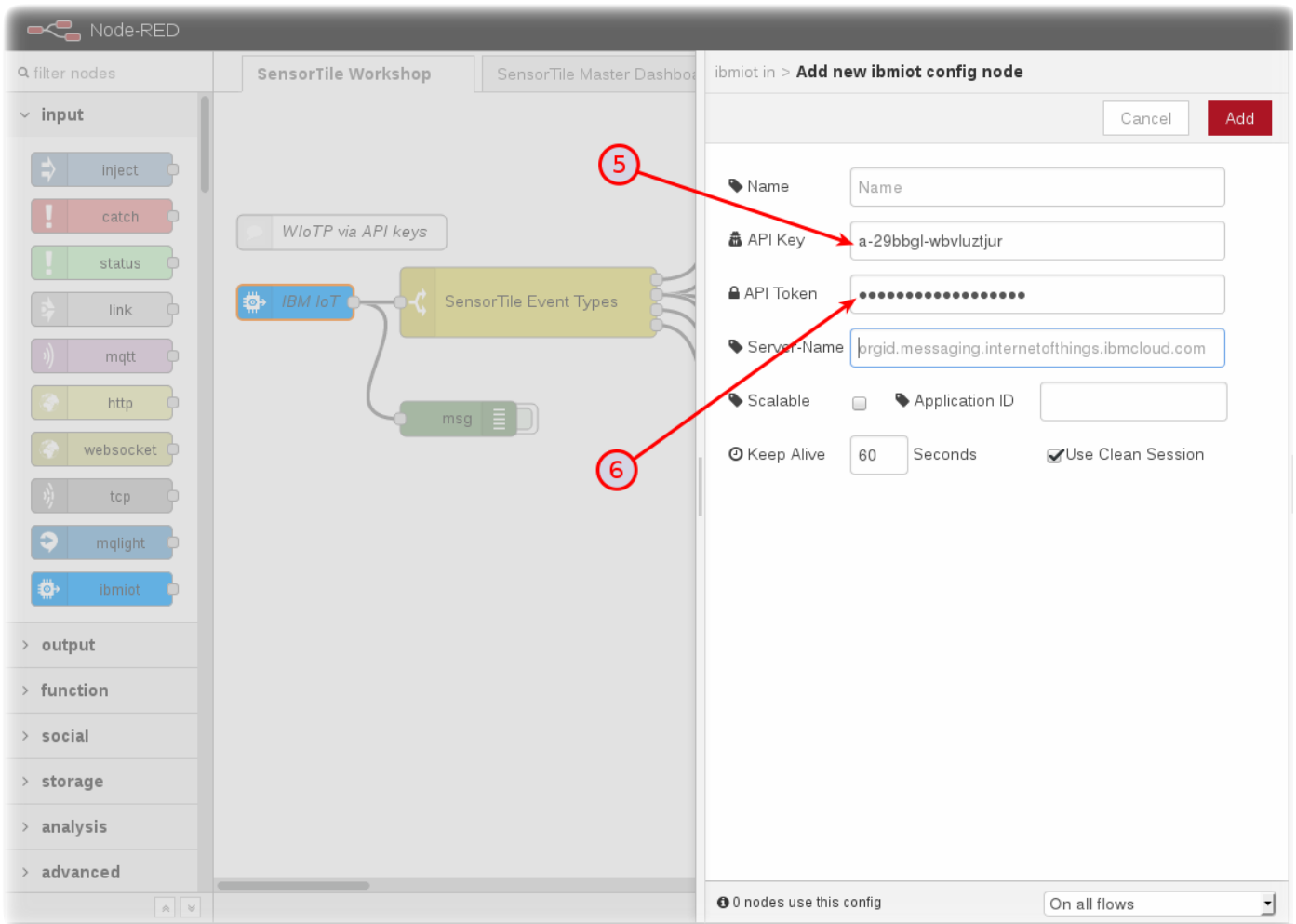
- Click on the **Edit** icon (3) to input the API Key and API Token.




- Click on the API Key (5) field and enter

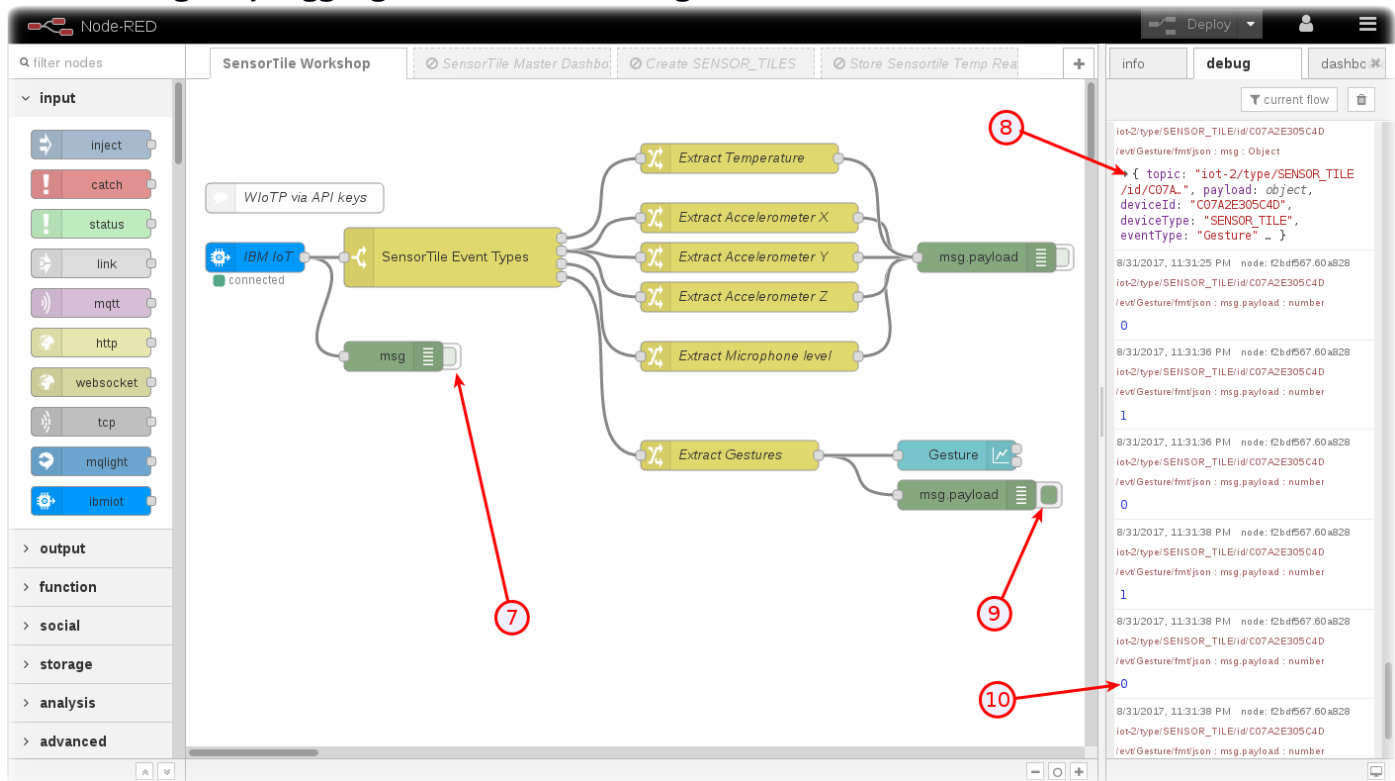
**a-29bbgl-wbvluztjur**

- Since the Workshop materials are posted on the public Internet github, the instructor will display the API Token on the projector for you to enter manually (6)



- Click on the red **Add** button.
- Click on the red **Done** button.
- Click the Deploy  **Deploy** button on the top of menu bar to deploy the Node-RED flow.

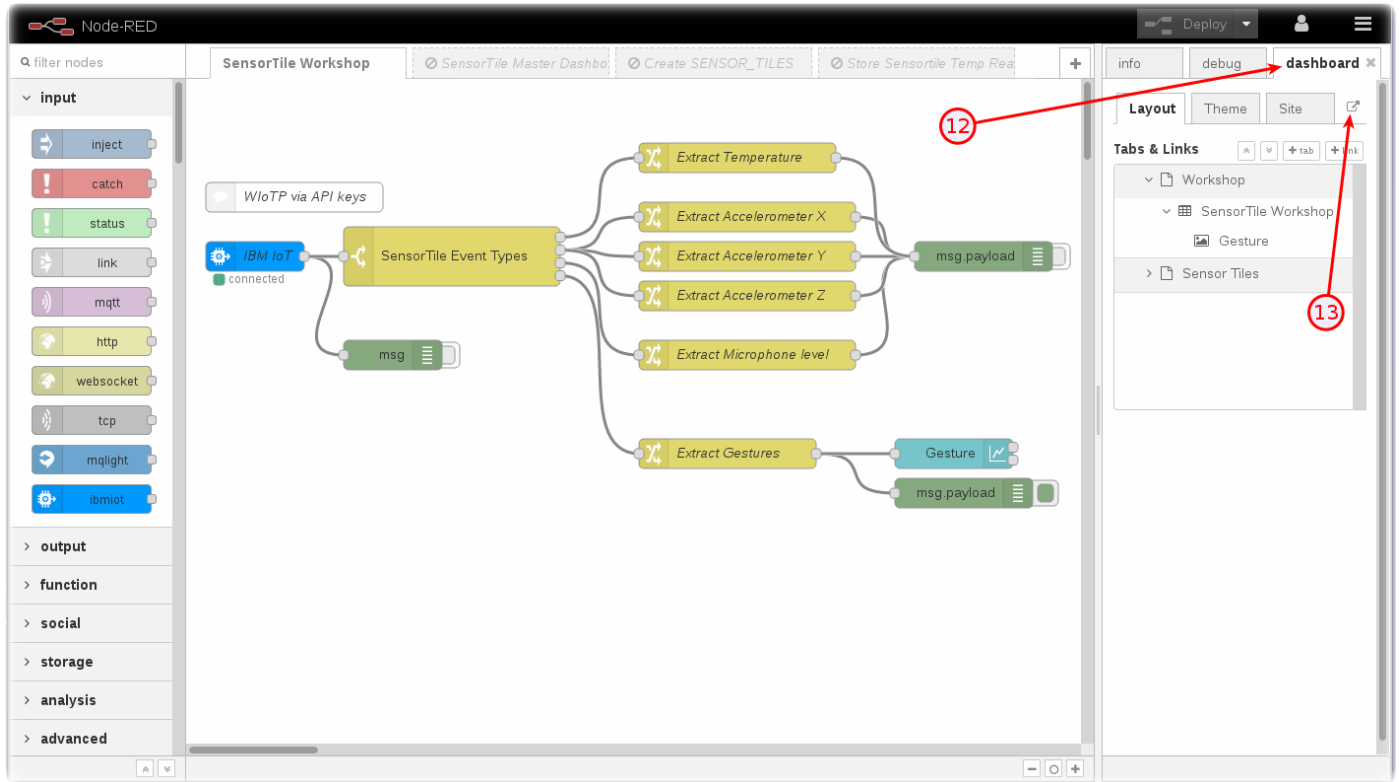
- Turn to the “**debug**” panel on the right Node-RED sidebar to see the SensorTile data flowing through your Node-RED application. The SensorTile and ST BlueMS mobile application sends high frequency data to Watson IoT Platform. The debug panel will scroll quickly with sensor messages (8). The data arrives in json format. You can turn on/off the output of the full messages by toggling the tab on the debug node (7).



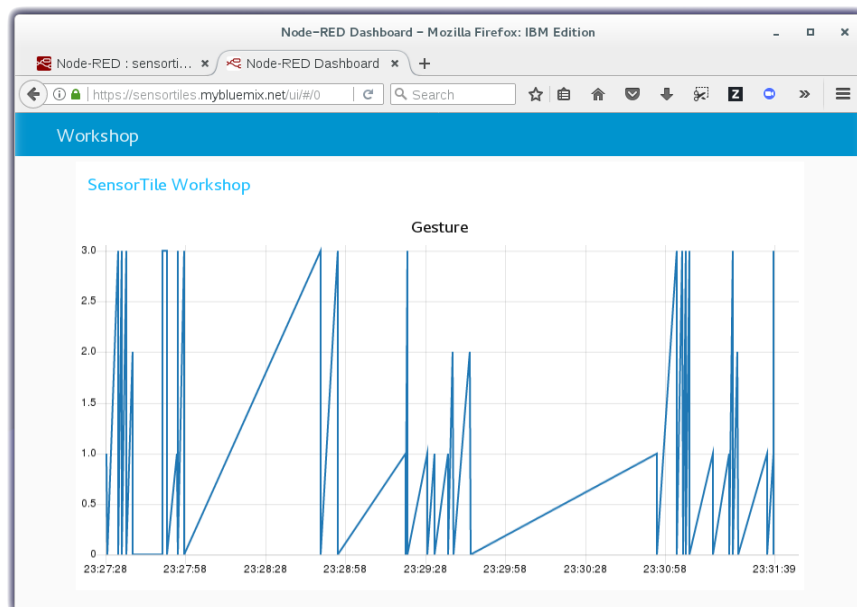
- This Node-RED flow is programmed to extract and plot several of the SensorTile sensor data. Within the ST BlueMS mobile application you can send Temperature, Acceleration and Microphone Level to this Bluemix application. As an independent exercise, you can send additional SensorTile sensor data by modifying the **SensorTile Event Types** switch node.
- As an example, the workshop will plot the Gesture events as you move the SensorTile. Observe the Gesture values (10) printed by the **debug** node (9).

## Step 5 – Launch the Node-RED Dashboard

- At the beginning of this Section, we added the Node-RED Dashboard nodes. This set of chart, gauge, slider, text, listbox nodes can quickly create live data dashboards. To launch the Node-RED dashboard, turn to the **dashboard** tab (12) in the Node-RED sidebar. Launch the Node-RED dashboard by clicking on the **launch** icon (13).

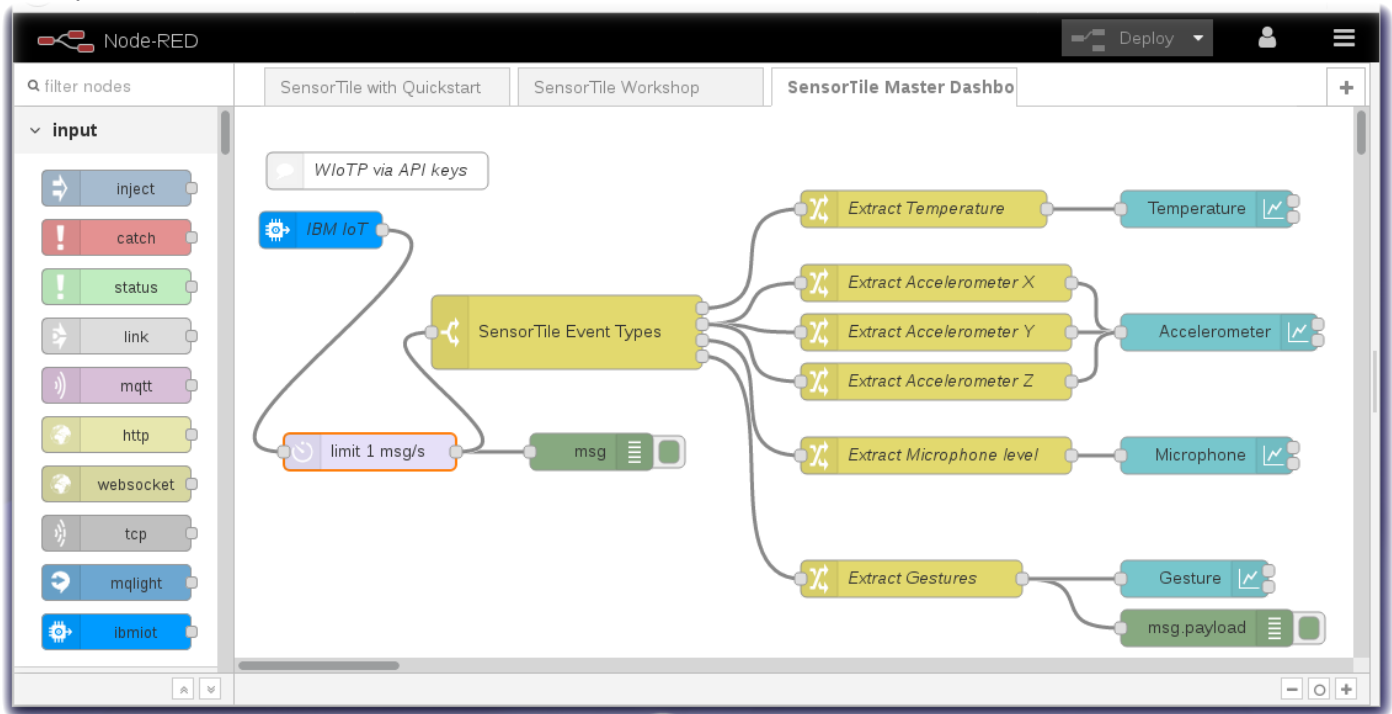


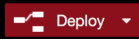
- A new browser tab will open and plots the Gesture events. Shake your SensorTile in various directions.

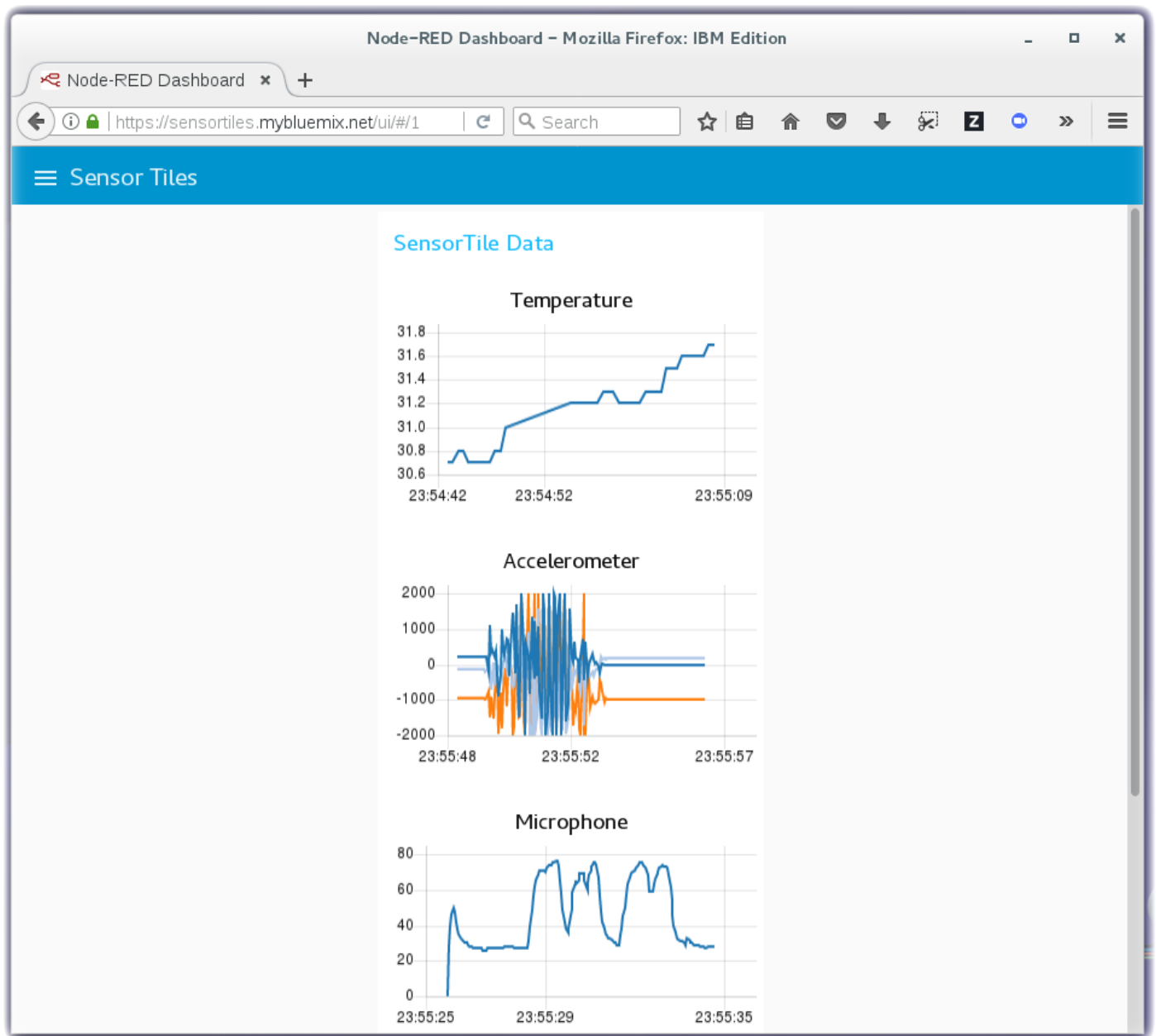


## Step 6 – Extra Credit – Additional Node-RED Dashboard Charts

- The SensorTile workshop time is limited. This remaining section will be Extra Credit for further exploration. Additional Node-RED Dashboard charts can be added to plot and visualize the Temperature, Acceleration and Microphone Level data from the SensorTile. You can plot multiple datasets on a single chart. In this flow, the Acceleration X, Y, Z data is plotted in one chart.



- Get the Code** from GitHub : <http://ibm.biz/sensortile-workshop-extra>
- Import** the Node-RED flow into your IoT Starter Application following the procedure learned in **Section 4 Step 2**. This flow will open in a new Node-RED tab called SensorTile Master Dashboard.
- Configure the IBM IoT node with the **Watson IoT Platform API Key / API Token** following the procedure learned in **Section 4 Step 4**.
- Note that a **Rate Limit delay** node has been inserted into this flow to slow the high frequency SensorTile data being plotted.
- Click the Deploy  button on the top of menu bar to deploy the Node-RED flow.
- Turn to the Node-RED Dashboard and switch to the new SensorTiles tab by pressing the menu in the upper left corner.



- Congratulations! You have completed the workshop.

## References

In this final section, we will challenge the workshop attendee to implement other projects using Watson IoT Platform, the Watson IoT Real Time Insights rules engine and alerts.

There are many recipes available at:

**<https://developer.ibm.com/recipes>**