

Mobile Device Movement/Accelerometer Sensor

Hands-On Lab

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AT&T 4G 2:07 PM 27% phone-sensor-app.mybluemix.net

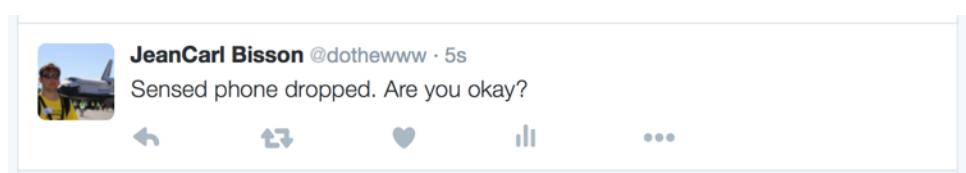
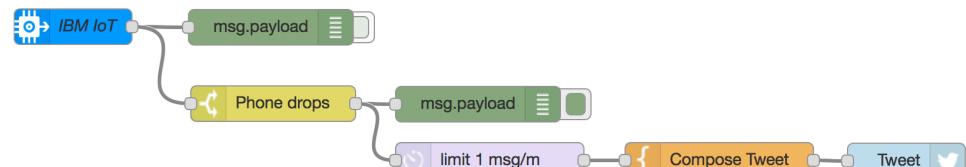
Your device ID: abcd1234
Connected

Published Messages: 43

Movement		
Alpha	Beta	Gamma
-312.91	22.41	-0.17

Acceleration		
X	Y	Z
-0.02	0.11	0.09

Location	
Latitude	Longitude
0	0



A digital copy of this lab/code can be found at:
<http://ibm.biz/lab-mobile-accelerometer-sensor>



Topics covered: Node-RED, Watson Internet of Things Platform, and Twitter.

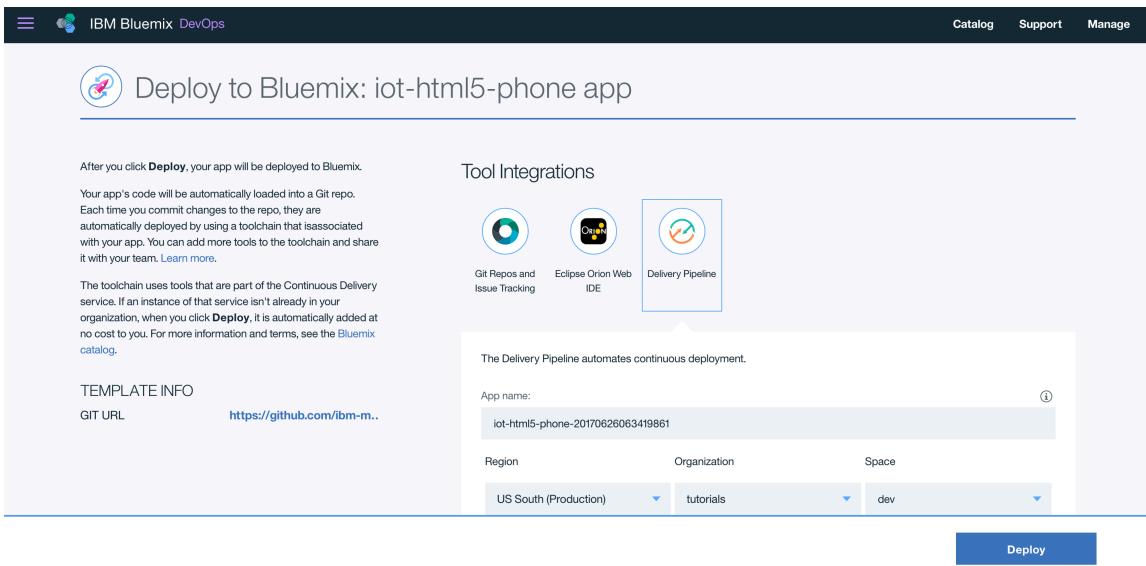
In this lab, we will deploy a web application that measures a mobile device's position, acceleration, and location. The application will send this data to the IBM Watson's Internet of Things Platform service in IBM Bluemix. In the second part of this lab, we will create a simple Node-RED application in Bluemix that listens to these device events and respond by tweeting a message when a sudden acceleration occurs.

Create a web-based mobile device sensor.....	3
Create an accelerometer sensor/alert system	8

Create a web-based mobile device sensor

In this section, we will deploy a sample Internet of Things application that reads a mobile device's position, accelerometer and location and sends this data to the IBM Watson IoT Platform service in IBM Bluemix.

1. Go to GitHub repo <http://ibm.biz/phone-sensor-app>
2. In the Read Me section, click on the  Create toolchain button.
3. Enter a custom app name or use the default given. You can also customize the region, organization, and space the application should be deployed to. Click on **Deploy**.



The screenshot shows the IBM Bluemix DevOps interface. At the top, there is a navigation bar with icons for three, IBM Bluemix DevOps, Catalog, Support, and Manage. Below the navigation bar, the main title is "Deploy to Bluemix: iot-html5-phone app".

On the left, there is a sidebar with "TEMPLATE INFO" and "GIT URL" sections. The GIT URL is listed as <https://github.com/ibm-m..>.

The main content area has a heading "Tool Integrations" with three icons: "Git Repos and Issue Tracking", "Eclipse Orion Web IDE", and "Delivery Pipeline" (which is highlighted with a blue border).

Below the tool integrations, there is a box stating "The Delivery Pipeline automates continuous deployment." It contains fields for "App name:" (set to "iot-html5-phone-20170626063419861"), "Region" (set to "US South (Production)"), "Organization" (set to "tutorials"), and "Space" (set to "dev").

At the bottom right, there is a large blue "Deploy" button.

4. IBM Bluemix will create a new project, clone the repo, and deploy the application to the region and space you specified. When the application has been deployed successfully, click on the **View app** button.

5. Enter a unique ID of at least 8 characters and tap **OK**. You should see the status change to Connected, and start publishing messages. These messages are sent to the Watson IoT Platform service in Bluemix and contain the movement and any acceleration the phone may experience.

Movement		
Alpha	Beta	Gamma
-312.91	22.41	-0.17

Acceleration		
X	Y	Z
-0.02	0.11	0.09

Location	
Latitude	Longitude
0	0

6. Using a computer, open the application overview in your Bluemix dashboard. Click on the Internet of Things Platform link in the left sidebar. Click on the green **Launch** button.

IBM Bluemix Internet of Things

Catalog Support Account

Phone-sensor-app

Internet of Things Platform

Welcome to Watson IoT Platform

Securely connect, control, and manage devices. Quickly build IoT applications that analyze data from the physical world.

Launch Docs

Learn about Watson IoT Platform

Understand the architecture, concepts, and features of the Watson IoT Platform service and see how it fits in the extended Bluemix universe and your own IoT infrastructure.

Connect and expand by using developerWorks recipes

Browse a multitude of custom recipes to connect your devices to Watson IoT Platform, expand on the basic service, and consume the device IoT data flow

7. This is the IBM Watson IoT Platform dashboard. You can see the connected devices that have been registered through the application you just deployed and ran. Hover over the icons in the left sidebar and click on Devices.

IBM Watson IoT Platform

QUICKSTART SERVICE STATUS DOCUMENTATION BLOG jbisson@us.ibm.com ID: (r17jhg)

All Boards

+ Create New Board

Your boards

Sort By Recently changed

USAGE OVERVIEW	RISK AND SECURITY OVERVIEW	RULE-CENTRIC ANALYTICS	DEVICE-CENTRIC ANALYTICS
3 Cards Owned by you	4 Cards Owned by you	6 Cards Owned by you	5 Cards Owned by you

The screenshot shows the IBM Watson IoT Platform dashboard. On the left, a sidebar menu lists various sections: BOARDS, DEVICES, MEMBERS, APPS, USAGE, RULES, SECURITY, SETTINGS, and EXTENSIONS. The main area displays three cards under the heading 'RISK AND SECURITY OVERVIEW': '4 Cards' (Owned by you), '6 Cards' (Owned by you), and 'DEVICE-CENTRIC ANALYTICS' (5 Cards). A blue button '+ Create New Board' is located in the top right corner.

8. The next screen displays all the devices that have been registered to your instance of the IBM Watson IoT Platform service. You should see the Device ID that you entered on your mobile device. Click on it.

The screenshot shows the 'Devices' page in the IBM Watson IoT Platform. The left sidebar has icons for Boards, Devices, Members, Apps, Usage, Rules, Security, Settings, and Extensions. The main content area is titled 'Devices' and includes buttons for 'Browse', 'Diagnose', 'Action', 'Device Types', 'Manage Schemas', 'Refresh', and '+ Add Device'. A table lists one device: 'abcd1234' (Device Type: 'iotphone', Class ID: 'Device', Date Added: 'Feb 3, 2017 7:29:13 PM'). The table has columns for Device ID, Device Type, Class ID, Date Added, and Location. There are also icons for refresh, search, and delete.

9. A dialog displays the recent events that have been sent from that device. Scroll down to the **Sensor Information** section.

The screenshot shows the IBM Watson IoT Platform interface. On the left, a sidebar lists various sections: Devices, Connection Information, Recent Events (selected), Device ID, Sensor Information, Metadata, Device Information, Diagnostic Logs, Error Codes, Connection Log, and Actions. The main content area is titled "Device abcd1234". It contains two tabs: "Connection Information" and "Recent Events". The "Connection Information" tab shows details like Device ID (abcd1234), Device Type (iotphone), Date Added (Friday, February 3, 2017), Added By (jbisson@us.ibm.com), and Connection State (Connected on Friday, February 3, 2017 at 7:29:57 PM from 50.143.173.191 with an insecure connection). The "Recent Events" tab lists ten sensorData events received between Feb 3, 2017 7:30:55 PM and Feb 3, 2017 7:30:56 PM, all in json format.

Event	Format	Time Received
sensorData	json	Feb 3, 2017 7:30:55 PM
sensorData	json	Feb 3, 2017 7:30:55 PM
sensorData	json	Feb 3, 2017 7:30:56 PM
sensorData	json	Feb 3, 2017 7:30:56 PM
sensorData	json	Feb 3, 2017 7:30:56 PM
sensorData	json	Feb 3, 2017 7:30:56 PM
sensorData	json	Feb 3, 2017 7:30:56 PM
sensorData	json	Feb 3, 2017 7:30:56 PM
sensorData	json	Feb 3, 2017 7:30:56 PM
sensorData	json	Feb 3, 2017 7:30:56 PM

10. The Sensor Information section displays the last data that is submitted to the IoT Platform by the device. As you move the device, the values change.

The screenshot shows the IBM Watson IoT Platform interface. The sidebar and main content area are identical to the previous screenshot, but the "Sensor Information" section is now selected. This section displays a table of sensor data points with their corresponding values and times received. The data points include d.id, d.ts, d.lat, d.lng, d.ax, d.ay, d.az, d.oa, d.ob, and d.og.

Event	Datapoint	Value	Time Received
sensorData	d.id	abcd1234	Feb 3, 2017 7:31:06 PM
sensorData	d.ts	1486179067465	Feb 3, 2017 7:31:06 PM
sensorData	d.lat	0	Feb 3, 2017 7:31:06 PM
sensorData	d.lng	0	Feb 3, 2017 7:31:06 PM
sensorData	d.ax	-0.02	Feb 3, 2017 7:31:06 PM
sensorData	d.ay	0	Feb 3, 2017 7:31:06 PM
sensorData	d.az	0.02	Feb 3, 2017 7:31:06 PM
sensorData	d.oa	21.25	Feb 3, 2017 7:31:06 PM
sensorData	d.ob	-4.52	Feb 3, 2017 7:31:06 PM
sensorData	d.og	-18.16	Feb 3, 2017 7:31:06 PM

Create an accelerometer sensor/alert system

In this section, we will create a simple application that listens to the data the device sends to the Watson IoT platform and respond to a sudden acceleration. For example, this could simulate a sudden fall.

1. In the Bluemix dashboard, click on the **Catalog** link. Create a new Node-RED application by clicking on the **Node-RED Starter** tile under the **Boilerplates** section.

The screenshot shows the IBM Bluemix Catalog interface. On the left, there's a sidebar with categories like All Categories, Infrastructure, Apps (with Boilerplates selected), and Services. The main area displays various starter applications. A blue arrow points from the text above to the 'Node-RED Starter' tile, which is highlighted with a light blue box. The tile contains a small icon of a red robot, the text 'Node-RED Starter', and a brief description: 'This application demonstrates how to run the Node-RED open-source project within IBM Bluemix'. Below the tile, there are other starters like 'MobileFirst Services Starter', 'Node.js Cloudant DB Web Starter', and 'Python Flask'.

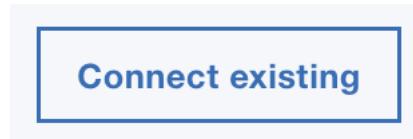
2. Enter a name for the application. Choose a host name that is unique. Make note of this host name, it will be used in step #7. Click on **Create**.

The screenshot shows the 'Create a Cloud Foundry App' page for the 'Node-RED Starter'. At the top, it says 'Create a Cloud Foundry App'. The 'Node-RED Starter' section is expanded, showing its description: 'This application demonstrates how to run the Node-RED open-source project within IBM Bluemix.' Below this, there are fields for 'App name:' (set to 'phone-app-application'), 'Host name:' (set to 'phone-app-application'), and 'Domain:' (set to 'mybluemix.net'). Under 'Selected Plan:', it shows 'SDK for Node.js™' and 'Default'. To the right, it shows 'Cloudant NoSQL DB' and 'Lite'. At the bottom, there are links for 'View Docs', 'VERSION 0.5.1', 'TYPE Boilerplate', 'REGION US South', and 'Need Help? Contact Bluemix Sales'. There are also buttons for 'Estimate Monthly Cost' and 'Cost Calculator', and a large blue 'Create' button.

3. Wait for the application to finish staging. Click on the **Overview** link in the left sidebar.

The screenshot shows the IBM Bluemix Cloud Foundry Apps interface. At the top, there's a navigation bar with 'IBM Bluemix Cloud Foundry Apps' and links for 'Catalog', 'Support', and 'Account'. Below the navigation is a sidebar with links: 'Dashboard', 'Getting started' (which is selected), 'Overview', 'Runtime', 'Connections', 'Logs', and 'Monitoring'. The main content area displays the application 'phone-app-application' with a status of 'Starting'. A 'View app' button and a dropdown menu are at the top right. The 'Getting started' section contains two numbered steps: 1. After your application has started, click on the **Routes URL** or enter the following URL in a browser: `http://<yourhost>.mybluemix.net`. Step 2. Click **Go to your Node-RED flow editor**. This opens up a browser-based flow editor that makes it easy to wire together devices, APIs, and online services by using the wide range of nodes included in its palette. Below these steps is a section titled 'Customizing your Node-RED instance' with a 'Download CF Command Line Interface' button. At the bottom of the main content area is another step: 1. Download and extract your starter code to set up your development environment.

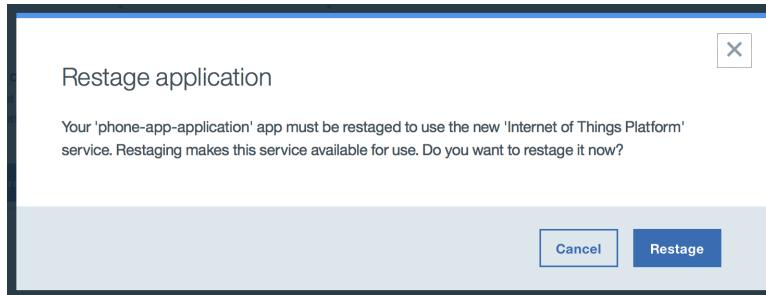
4. We need to connect our application to the Watson IoT Platform service that was created in the other application. To do this, we “connect [an] existing” service to our new application. Both applications will then share access to this service concurrently. The first application sends the data to the service; the second application subscribes to the data from the service. Click on **Connect existing** in the top-right corner.



5. Select the IBM Watson IoT Platform service and click **Connect**.

The screenshot shows a modal dialog box titled 'Connect existing service'. It has a close button in the top right. Below the title, there's a 'Services' tab. Under the 'Services' tab, a single service is listed: 'Internet of Things Platform-3m IBM'. At the bottom of the dialog, there's a note: 'Select compatible service to connect to jcsampleapp' and a 'Connect' button.

- When prompted that the application must be restaged, click on **Restage**.



- When the application has restarted, open a browser tab and visit your application's URL (`http://<host-name-from-step-#2>.mybluemix.net`). This is Node-RED, a graphical programming interface where you can drag and drop nodes (predefined functions) and connect them together to construct a flow (a program of functionality). Click on the red button labeled **Go to your Node-RED flow editor**.

Node-RED on IBM Bluemix

Node-RED
Flow-based programming for the Internet of Things

Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways.

This instance is running as an IBM Bluemix application, giving it access to the wide range of services available on the platform.

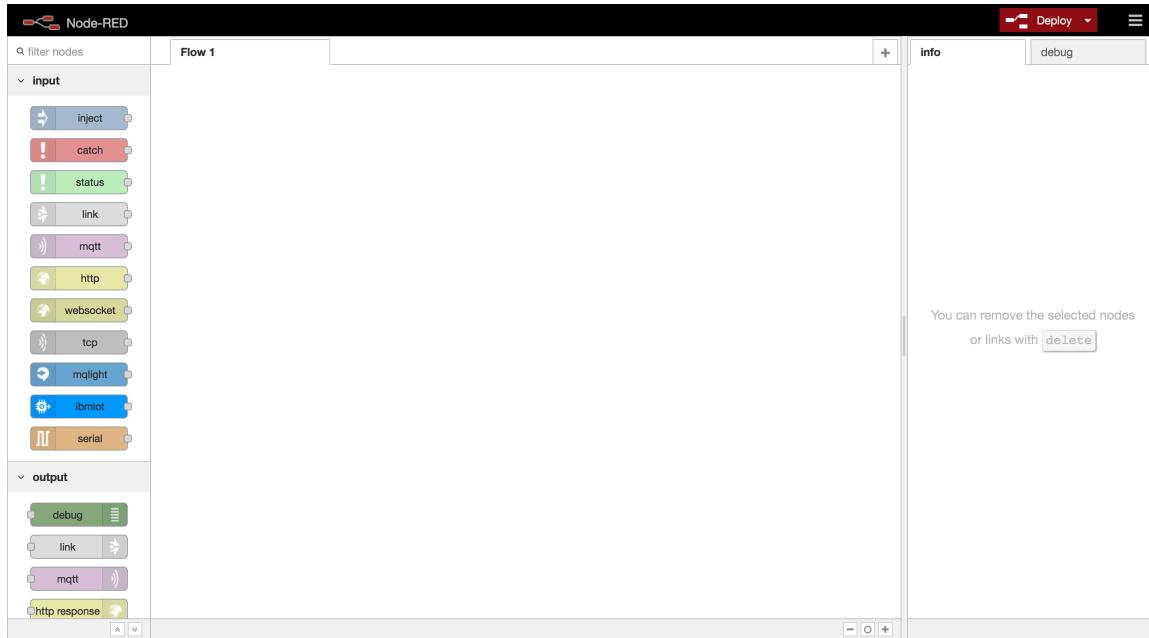
More information about Node-RED, including documentation, can be found at nodered.org.

[Go to your Node-RED flow editor](#)

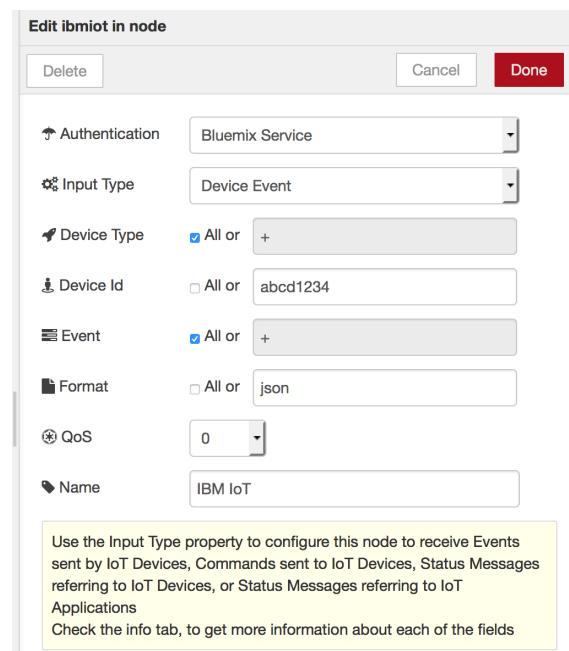
[Learn how to customise Node-RED](#)

Customising your instance of Node-RED
This instance of Node-RED is enough to get you started creating flows.

8. There are four things to note about the Node-RED interface. The palette in the left-sidebar contains nodes that perform pre-defined functionality. Click on each node in the palette and read the details in the info tab in the right sidebar. Drag nodes into the middle canvas and connect the grey nobs together to compose what is called a flow, executed from left to right. In the right sidebar, the info tab explains what the nodes do and their input and outputs; and the debug tab displays data from the debug node. Finally, the red **Deploy** button in the top-right corner deploys any unsaved nodes and flows.



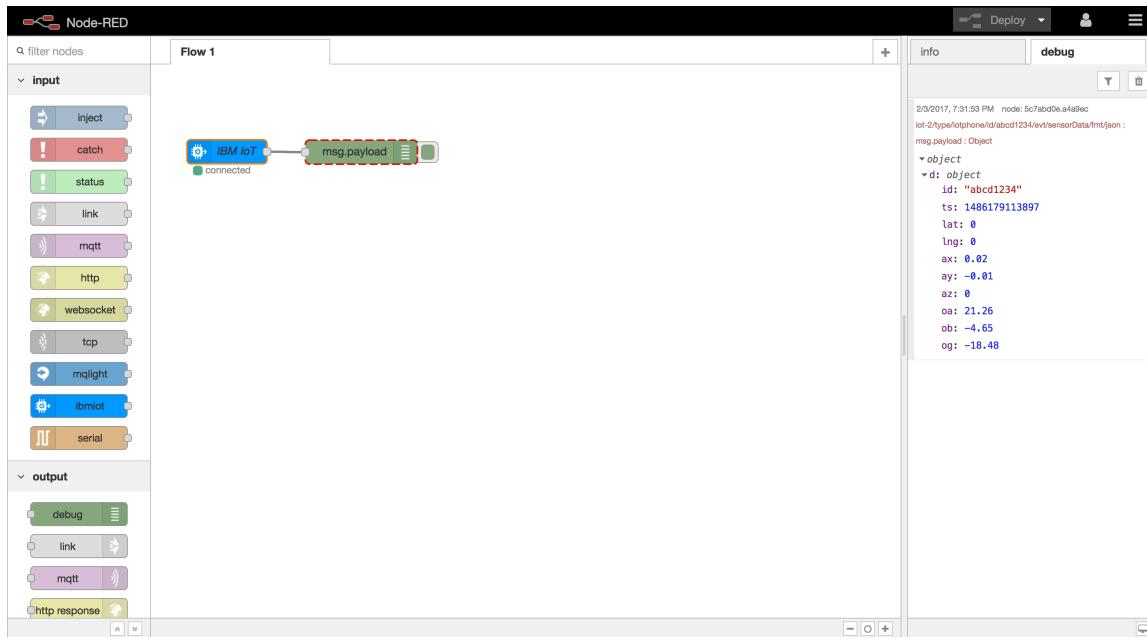
9. Let's create a simple flow that listens to the events from our mobile device and displays the contents. Drag a node and a node to the canvas. Double click on the node and customize the settings as shown below. Use the same Device ID as you had on the mobile device.



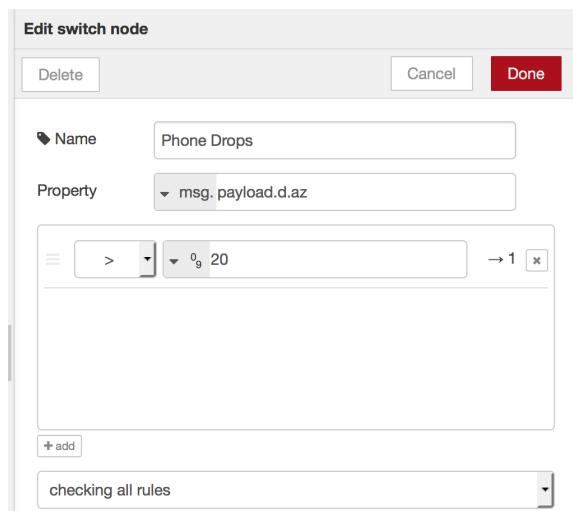
10. The completed flow should look like the following. Click on the  Deploy button in the top-right corner to deploy and save your changes.



11. Click on the debug tab in the right sidebar. The sensor data from the phone should be displayed.

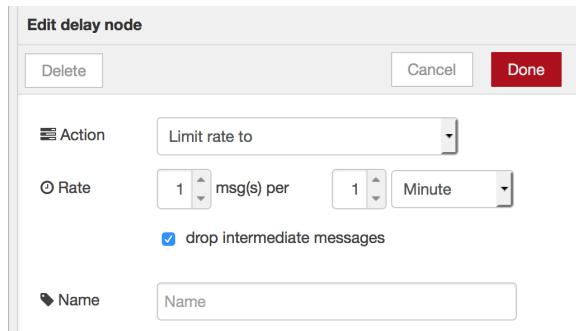


12. Click on the green tab to the right of the debug node in the canvas. This toggles off/on the messages shown in the debug tab. Next, add a  switch statement as shown below.



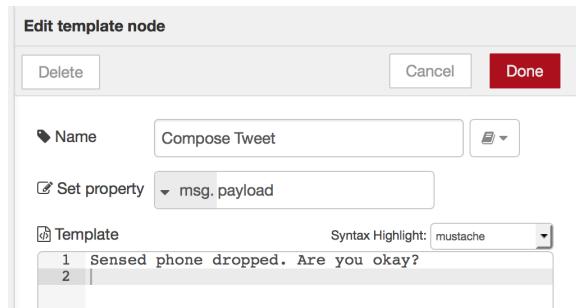
This will filter out any messages where the az value doesn't exceed the value 20. In other words, we only want to proceed with the flow when the value of az exceeds the value 20 (arbitrary value, you can change it if the device is less sensitive).

13. Add a  node as shown below.

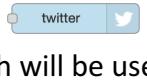


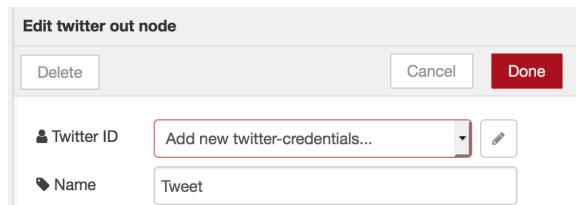
This node limits how often the rest of flow is run. Since the acceleration could exceed this value more than one, without this node, a tweet could be sent several times. With this node, we can limit this flow to send a tweet once per minute.

14. Add a  node as shown below.



This composes a message that we will tweet.

15. Add a  node. Click on the pencil button and authenticate with Twitter. The account you sign in with will be used to send tweets.





Authorize Node RED to use your account?

[Authorize app](#)

[Cancel](#)



Node RED

nodered.org

Node-RED Twitter node

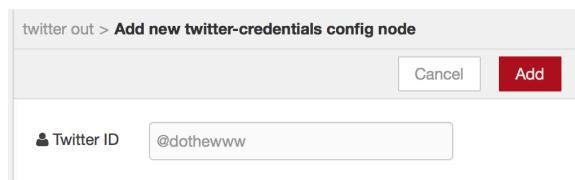
This application will be able to:

- Read Tweets from your timeline.
- See who you follow, and follow new people.
- Update your profile.
- Post Tweets for you.
- Access your direct messages.

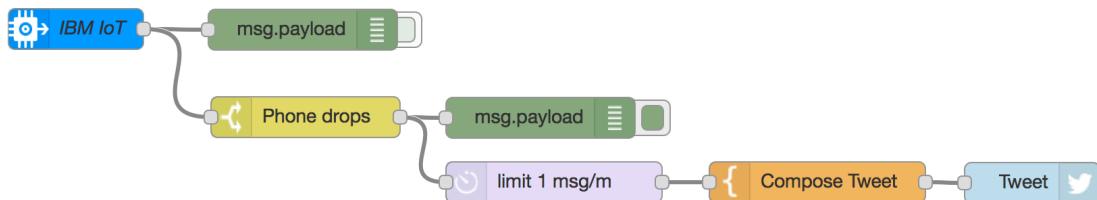
Will not be able to:

- See your Twitter password.

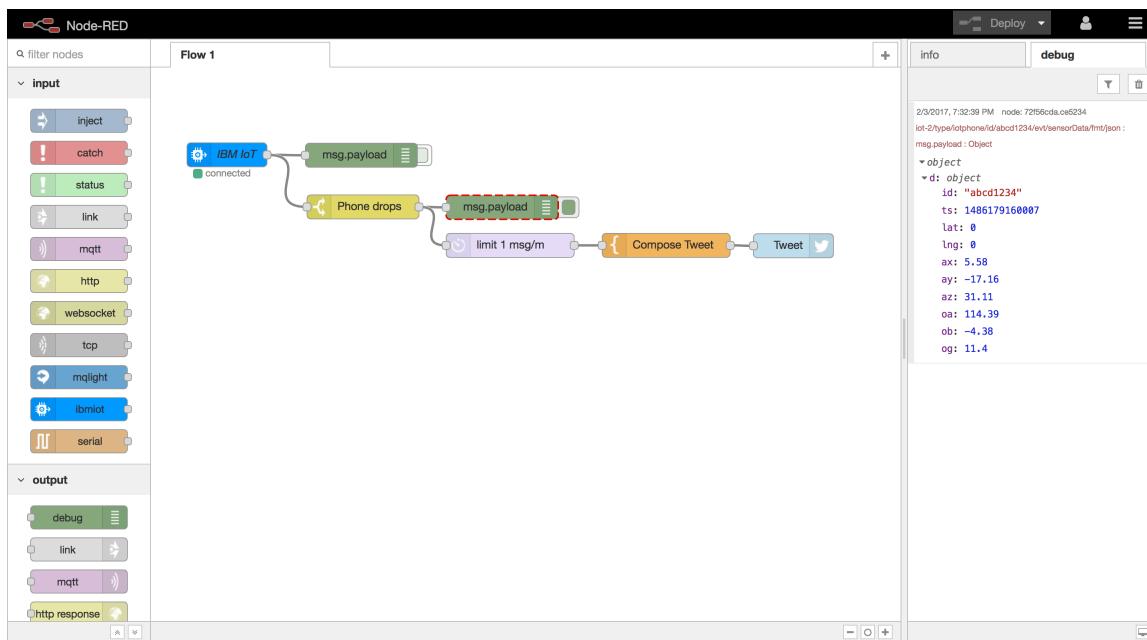
Return back to the node configuration. The settings for the Twitter node should have your username set. Click **Add**.



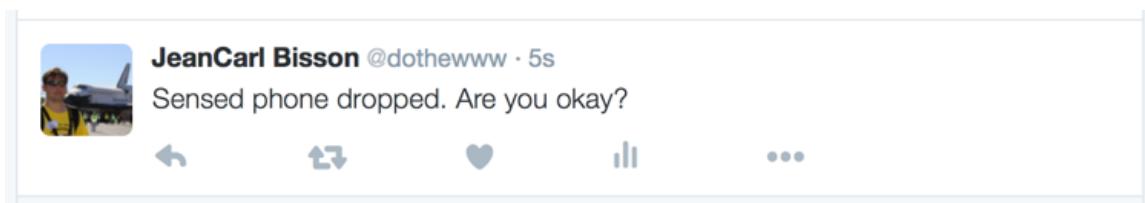
16. Connect the nodes together as shown below.



17. Click  Deploy to deploy and save the changes. Give the phone a quick jolt. The debug tab should display the sensor data.



18. Check the Twitter timeline for the tweet.



This lab demonstrates a simple Node-RED application that tweets a message when the mobile device receives a sudden jolt. However, this proof of concept can be extended.

You can change the message to send a Direct Message to a specific Twitter user, say a friend or family member (Hint: read the documentation of the  node to find out how to send a Direct Message).

You can also listen for a response from the user (Hint: a  node might help) and if the person has fallen and doesn't respond in a timely fashion, alert someone nearby to check on the owner of the mobile device.

What else you could measure based on the orientation, the movement, or the acceleration of the mobile device?