



Lab 2: IBM Watson IoT Quickstart Charting

Avnet BCM4343W IoT Starter Kit

Overview

This application makes use of an add-on sensor shield from NXP to demonstrate the capability of the Avnet BCM4343W board to periodically publish measurements from 9-axis of motion sensing (as well as it's on-board light sensor and Wi-Fi RSSI measurements) to the IBM Watson IoT "Quickstart" page for graphical visualization of the real-time data.

Requirements

- [Avnet BCM4343W IoT Starter Kit](#)
- ZentriOS SDK (ZentriOS-XZ version 3.2.0.4 or later)
- A Serial console application (such as TeraTerm or Putty)

Application Description

Beyond the publishing of sensor data to IBM Watson IoT Quickstart MQTT broker (where it is easily visualized using IBM's charting utility), this application also provides a foundation for further exercises with additional services from IBM Bluemix.

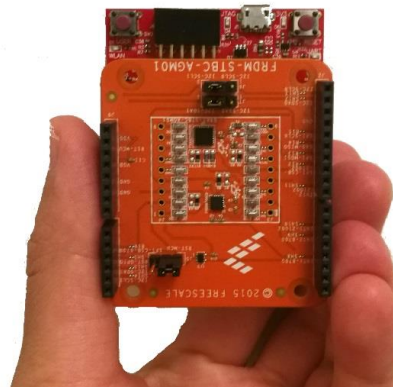
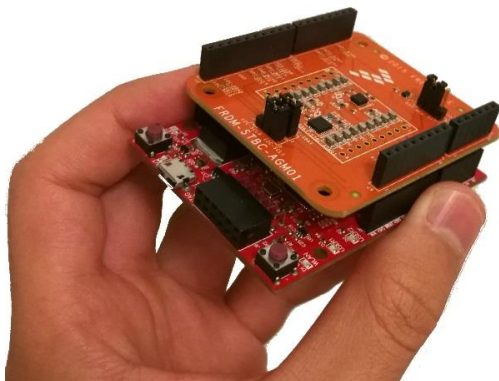
The measurements published include the on-board light sensor and Wi-Fi receiver signal strength, as well as the NXP shield's 9-axis of sensor measurements (accelerometer, magnetometer and gyroscope)

Key steps in this process are:

- Lab 2 firmware is compiled and downloaded to the Avnet IoT Kit assembly (NXP shield already attached),
- The module's Wi-Fi radio is then paired with the local Wi-Fi access point.
- The board then automatically runs the application connecting it to the IBM Quickstart broker
- The URL provided on the console screen is then used to bring-up the IBM QuickStart webpage (for this unique Device ID), where the published data measurements are then viewed in real time

Procedure

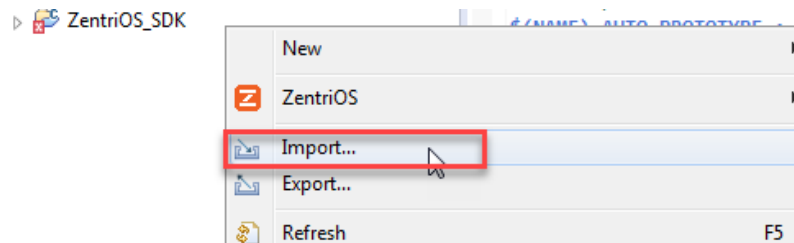
Attach the NXP shield to the BCM4343W IoT Starter Kit board



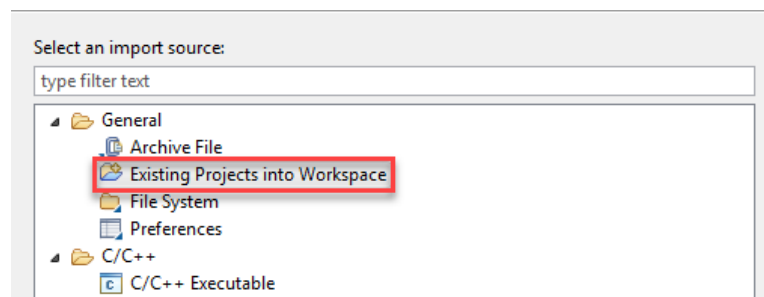


Build and Download the Application Firmware

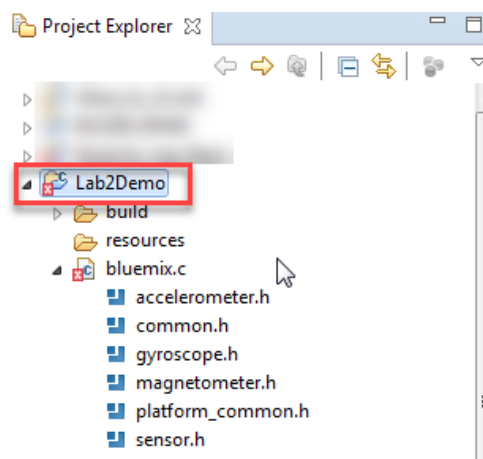
- 1) Launch ZentriOS SDK
- 2) Locate the provided Lab2.zip project source files and extract the Lab2Demo folder to the Zentri workspace (...\\Zentri\\workspace).
- 3) Right click in the Zentri Project Explorer panel then click "Import..."



- 4) This will open up the Import menu - select "Existing Projects into Workspace" under the General folder, then click next.



- 5) Browse for the Zentri Workspace folder, select the Lab2Demo folder to import, click "OK" and then "finish". You should now see a "Lab2Demo" Project in your project explorer.

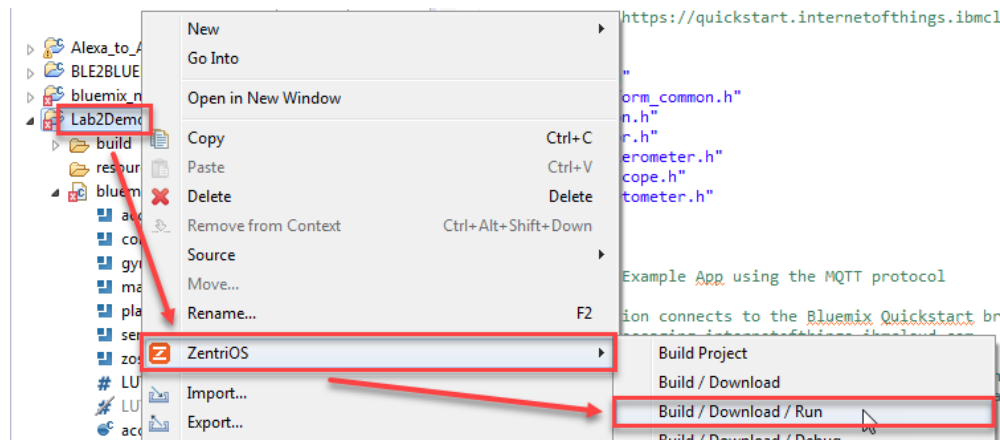


TROUBLESHOOTING: If you are having trouble with the setup process, it may be due to your antivirus software. Try making an exclusion to the ZentriOS SDK folder.



Run the Lab2 Application

- 6) To run the program, right click on the “Lab2Demo” folder, select “ZentriOS”, then click on “Build / Download / Run”



- 7) After successful build and download of this application to the hardware, open a serial console application to view the output from the hardware. Make sure that the serial console is properly configured and the Baud rate is set to 115200.
- 8) You will need to setup a Wi-Fi connection for your board in the serial console. Start by pressing the enter key one time to enter command mode, then type “network_up -s” into the console.

```
Ready
> network_up -s
Scanning for networks...
! 29 networks found
```

- 9) Locate your network and its ‘#’ on the list that appears. Enter your network number into the console followed by the password. Once connected, type “save” to have the device remember the network.

```
Type the number # that matches your Network: 11
Type the password for your Network : 1234!
In progress
[2000-01-01 | 00:42:20: Associating to ASUS]
> > Security type from probe: WPA2-AES
Obtaining IPv4 address via DHCP
IPv4 address: 192.168.43.203
[2000-01-01 | 00:42:28: Associated]
> save
Saved
Success
\ ■
```

- 10) Press the reset button on the board to reboot the program, or type “reboot”.



TROUBLESHOOTING: If you are having issues connecting your board to local Wi-Fi, try utilizing a mobile hotspot instead.



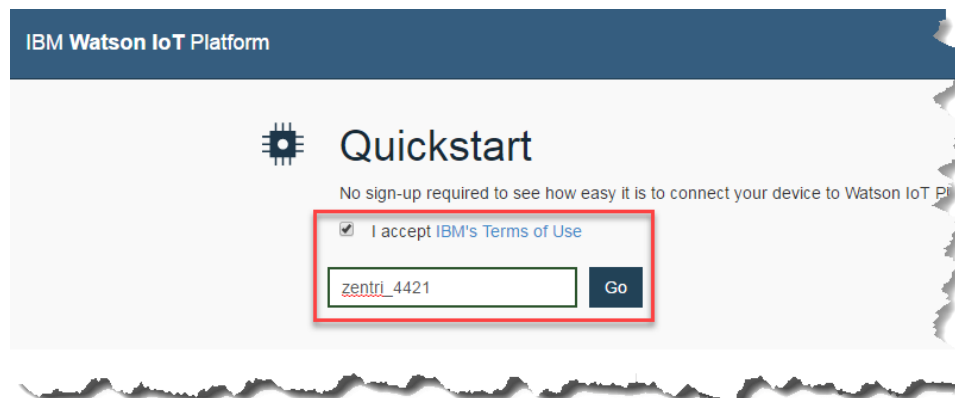
Visualize your data with IBM Quickstart Charting

- 11) After successful build and download of this application to the hardware, open a serial console application (**TeraTerm** or **Putty**) to view the status messages output from the hardware...

```
IBM Bluemix MQTT Demo Application Started
- Broker      : quickstart.messaging.internetofthings.ibmcloud.com
- Topic/Queue : iot-2/evt/zentri/fmt/json
- Client ID   : d:quickstart:type:zentri_4421

Website : https://quickstart.internetofthings.ibmcloud.com
Device ID: zentri_4421
```

- 12) Copy the **DeviceID** that was reported in the serial console and open IBM's IoT Quickstart webpage via console link (<https://quickstart.internetofthings.ibmcloud.com>). Accept the Terms of Use, paste your board's **DeviceID** into the entry box and click the "Go" button to access the Quickstart charting.



- 13) The Quickstart page now continuously updates a chart displaying telemetry on Y-axis vs timestamp on X-axis. Select any published datapoint to monitor it in real time.

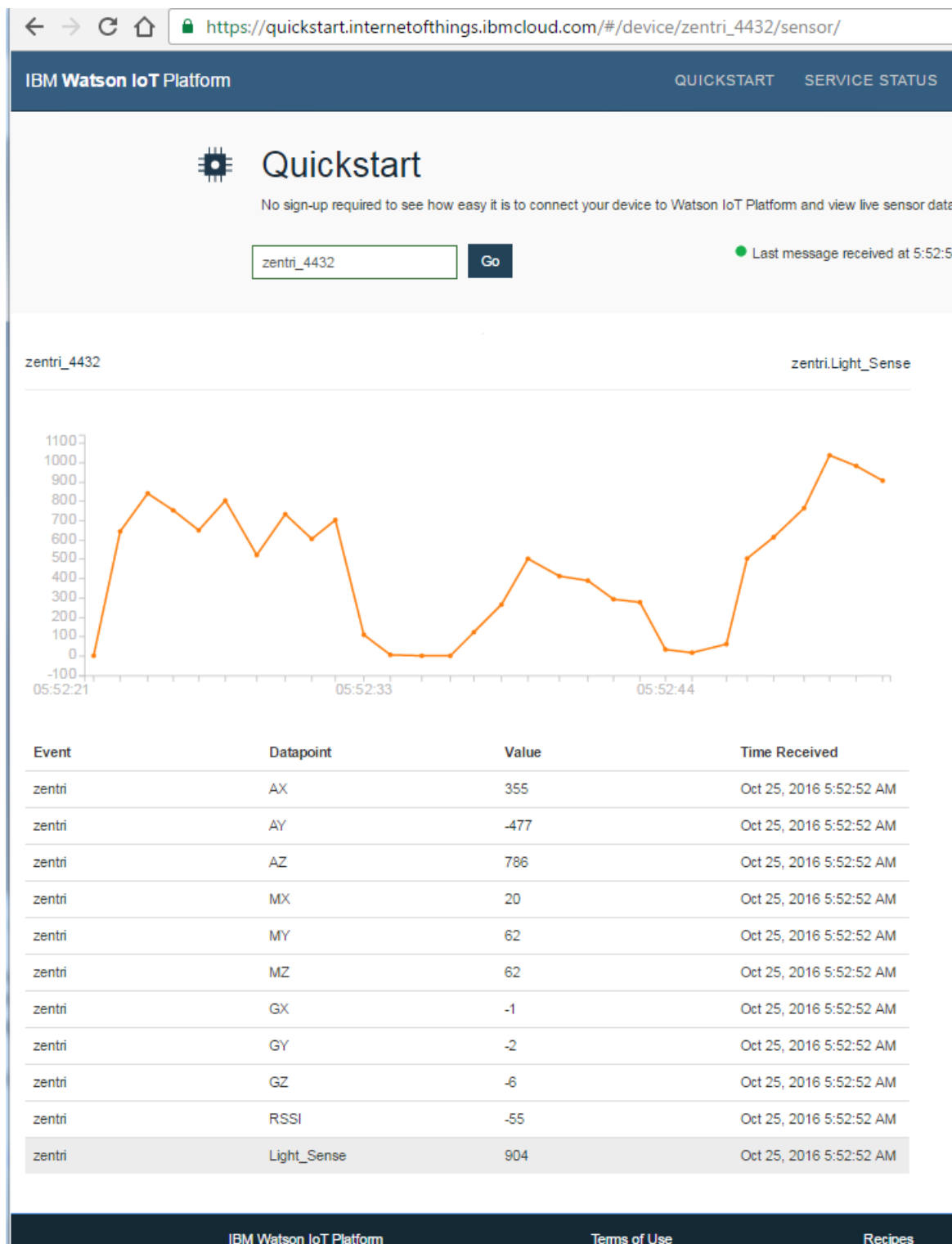
Testing

- 14) Experiment with different light-levels:
(cast a shadow on the light sensor with your hand, or use your SmartPhone's flashlight function)
- 15) Vary the reported RSSI:
(Attenuate the RF signal by shielding the module with your hand, or varying the board's proximity to the A/P)
- 16) Exercise the MEMs motion sensors on the NXP Shield:
(Experiment with linear and rotational movements as well as changing the orientation of the board assembly.
In each case, select the corresponding parameter in the listing below the chart and then monitor the charted values)

[See Screenshot on next page....]



- 17) The screenshot below shows the charting of the light sensor output (the vertical scale in this case is the 12bit range of the on-chip A/D Converter) in response to shadowing and illuminating the onboard ambient light sensor





LINKS:

Avnet BCM4343W IoT Starter Kit:

<http://cloudconnectkits.org>

ZentriOS SDK:

<https://docs.zentri.com/Wi-Fi/sdk/latest/user-guide/getting-started>