Installing ARTIK / ARTIK Cloud nodes

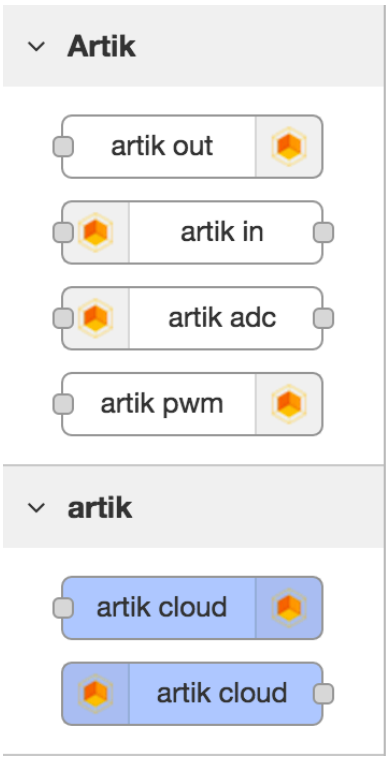
First, ensure Node-RED is installed on your ARTIK board. If you don't have Node-RED installed on your board, please run the two commands below from your board console.

```
#dnf install npm
#npm install –g node-red
```

Once you have Node-RED installed, install ARTIK and ARTIK Cloud custom nodes:

```
#npm install –g node-red-contrib-artik   node-red-contrib-artik-cloud
```

Start your Node-RED, and you can see the ARTIK/ARTIK Cloud nodes listed in the nodes container.



As you can see, we have 4 custom nodes to interface with ARTIK 5 and 10 I/Os and 2 custom nodes for ARTIK Cloud integration.

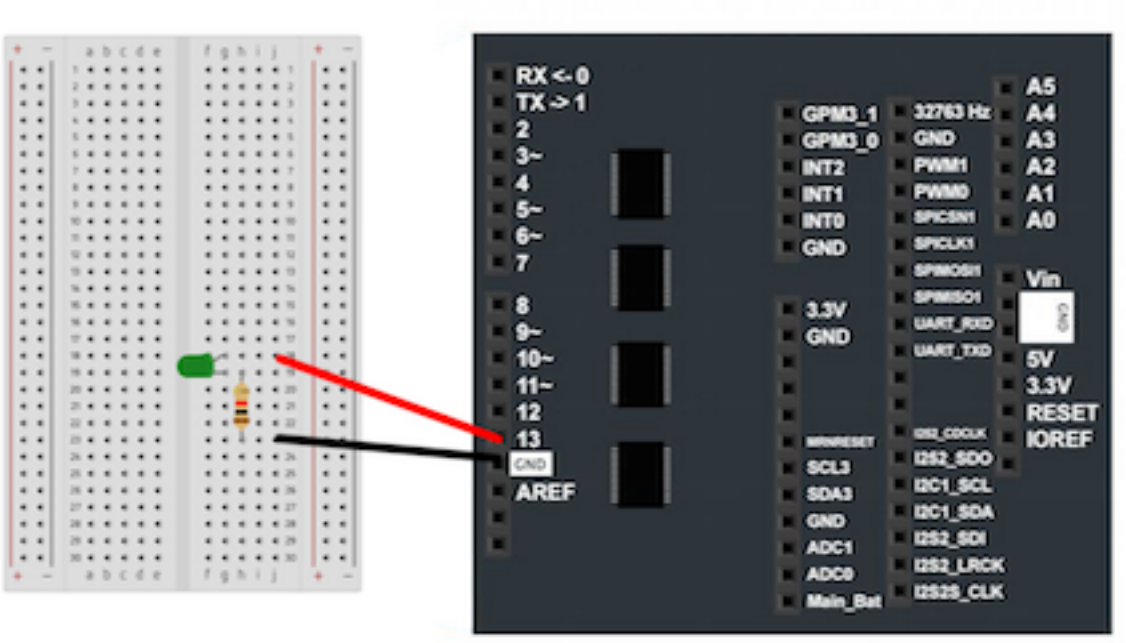
In this section we will show you how to use the ARTIK and ARTIK Cloud custom nodes to build IoT applications. These samples are illustrated by using ARTIK 5, but are fully portable to ARTIK 10.

Developing by using ARTIK / ARTIK Cloud nodes

Example 1: Blink an LED (artik out Node)

We will first show you how to “blink an LED” by using **artik out** node. **artik out** node is a node that sets a GPIO pin in the OUT direction and can also set the output state to HIGH or LOW on ARTIK.

Building the circuit

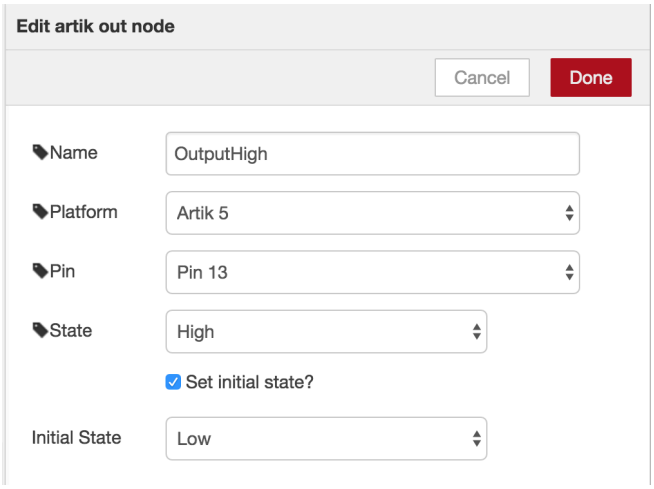


Developing Node-RED flow

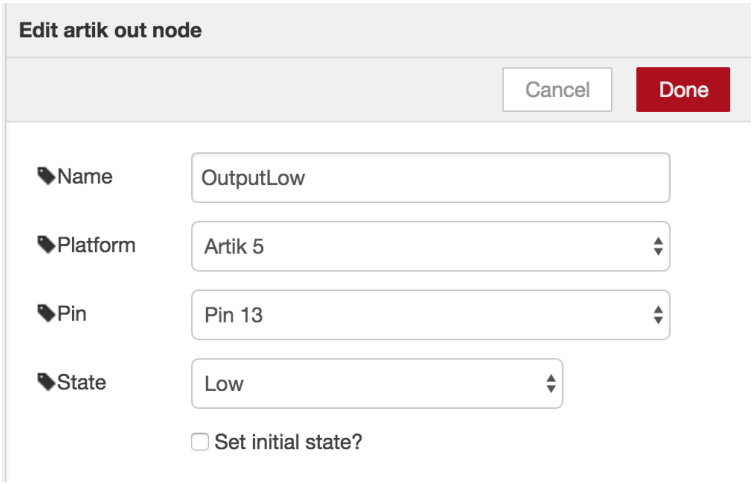
1. Drag an “artik out” node to the canvas, double click to configure it. In the Edit dialog, we select “ARTIK 5” as our target platform, then choose “Pin 13” as our digital output pin.

   As shown in the circuit, turning Pin 13 to “High” will turn on the LED, and “Low” will turn it off. Here in this node, we set Pin 13’s Initial State to “Low” and State to “High”. When Node-RED flow reaches this node, LED should be turned on.

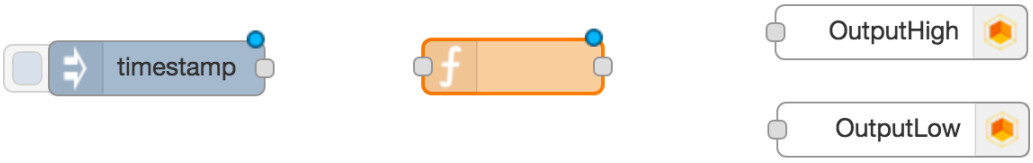
   Name the node as “OutputHigh”.



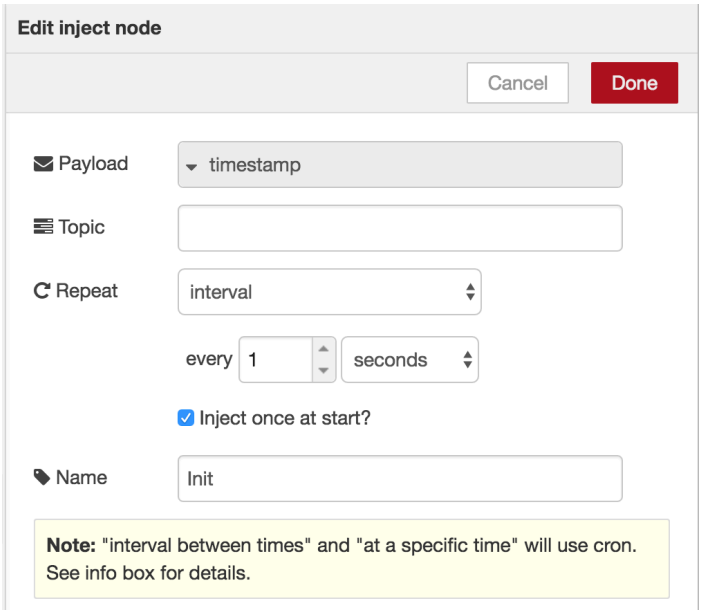
2. We need another “artik out” node to set Pin 13’s State to “Low” so we can toggle the LED.



3. Now, we add an inject node and a function node to our flow.



In inject node, we configure to repeat our flow every 1 second, and name the node as “Init”.



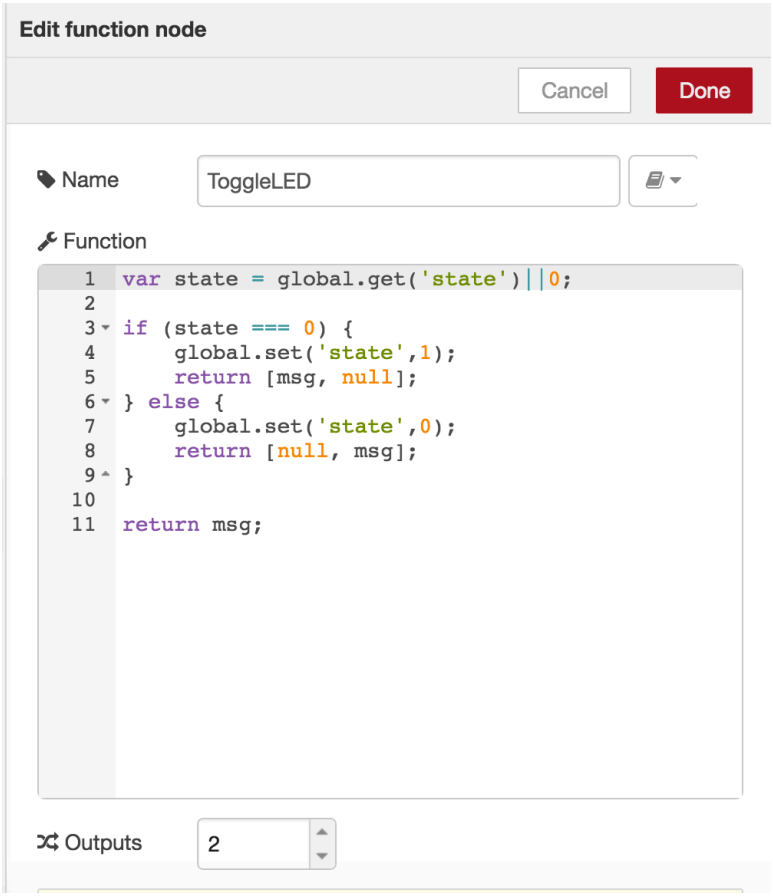
In function node, we set the number of outputs to be 2, so we can alternate between OutputHigh and OutputLow functions every second. Name the node as “ToggleLED”.

In this function, we use a global variable ‘state’ to track the state of Pin 13 output. If its current value is 0 (LOW), we trigger the execution of OutputHigh function to turn on the LED and set ‘state’ value to 1 (HIGH). Otherwise, we trigger the execution of OutputLow function to turn off the LED and set ‘state’ value to 0 (LOW).

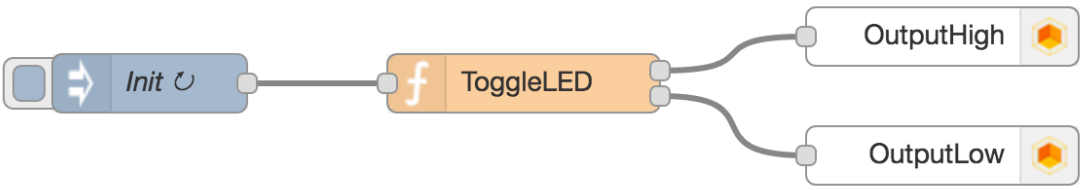
```
var state = global.get('state')||0;

if (state === 0) {
    global.set('state',1);
    return [msg, null];
} else {
    global.set('state',0);
    return [null, msg];
}

return msg;
```



Here is what the final flow looks like:

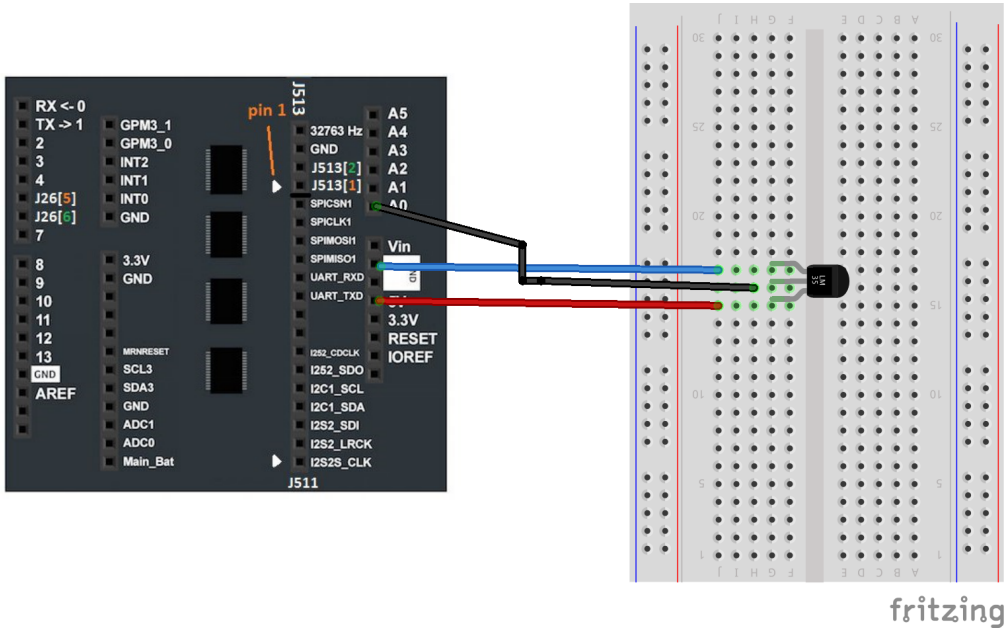


Deploy the flow, and you should see your LED blinks.

Example 2: Stream temperature data to ARTIK Cloud

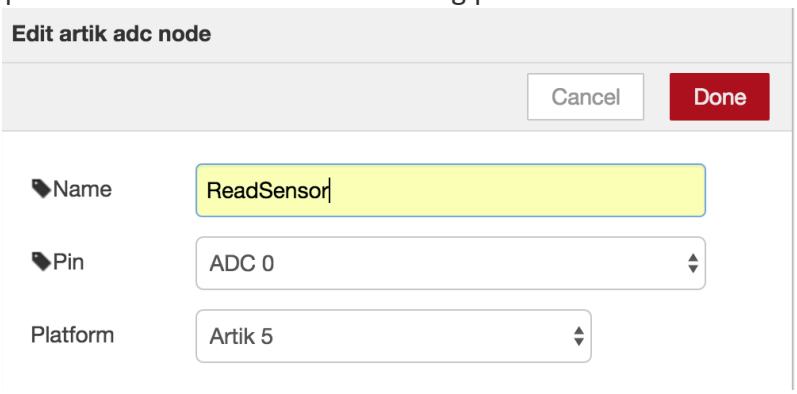
In the 2nd example, we are going to use **artik adc** node and **artik cloud out** node to collect analog sensor data and stream the data to ARTIK Cloud.

Building the circuit



Developing Node-RED flow

1. Drag an **artik adc** node to the canvas. On ARTIK 5 board, we have a temperature sensor connected to analog pin 0 on header J25. Select “ARTK 5 “ as the target platform and “ADC 0” as the analog pin# where we read the data from.



2. Connects a function node to the right side of artik adc node, where we will convert the voltage reading from ADC 0 pin to a temperature. Name the node as “ConvertToTemperature”. The function is defined like below:

```
var voltage_raw = msg.payload;
var voltage = voltage_raw * 2 * 0.439453125;

//Converting from 10mv per degree with 500mV offset
var temperatureC = (voltage - 0.5) * 100 ;
var temperatureF = (temperatureC * 9.0 / 5.0) + 32.0;
msg.payload = {
    "temperature": temperatureF
};
return msg;
```

3. Wire up an inject node and a debug node to the beginning and end of the flow. In "inject" node, we configure to read temperature sensor data every 10 seconds, name the node as "Init".

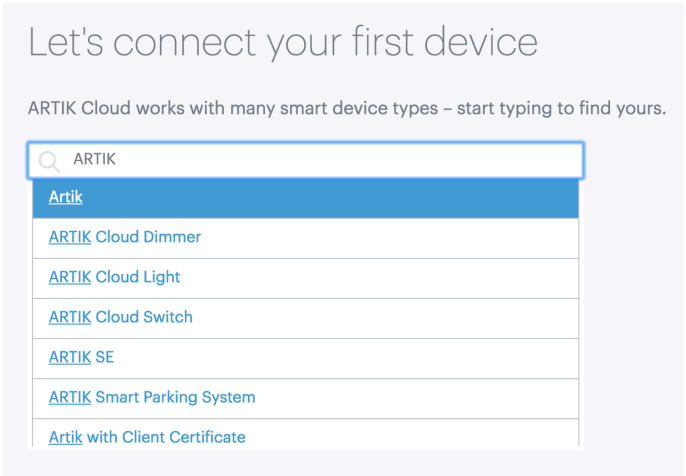
In "debug" node, we simply show msg.payload info on Node-RED Debug panel. Name the node as "DebugMsg".

Now, we can see the temperature updated on the debug panel every 10 seconds.

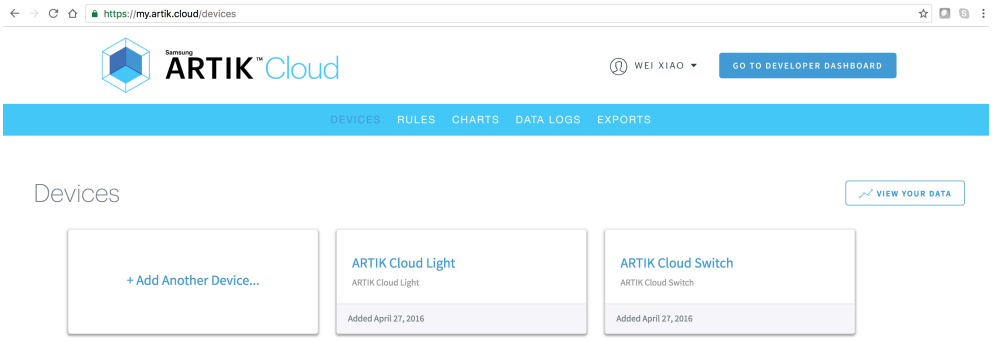
4. Next step, we will stream temperature to ARTIK Cloud. In order to do this, we need to create a temperature device instance in ARTIK Cloud.

4.1 Log into ARTIK Cloud user portal https://artik.cloud.

If this is your first device, you will be re-directed to the screen below:



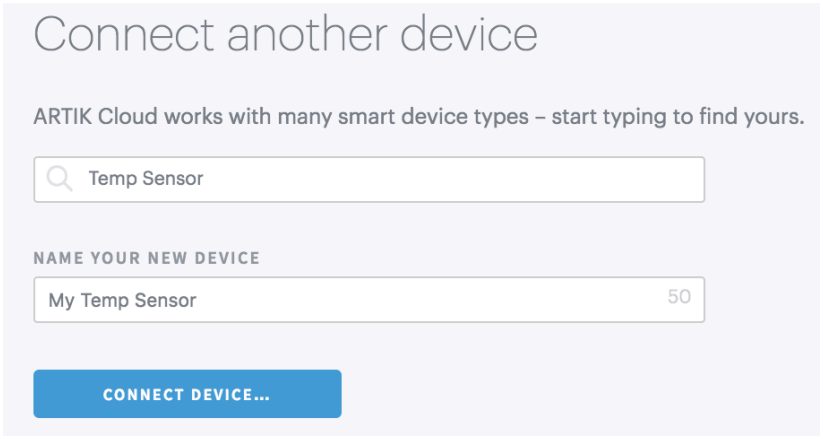
Otherwise, Under “MY ARTIK CLOUD”/”DEVICES”, you will see all you connected devices.



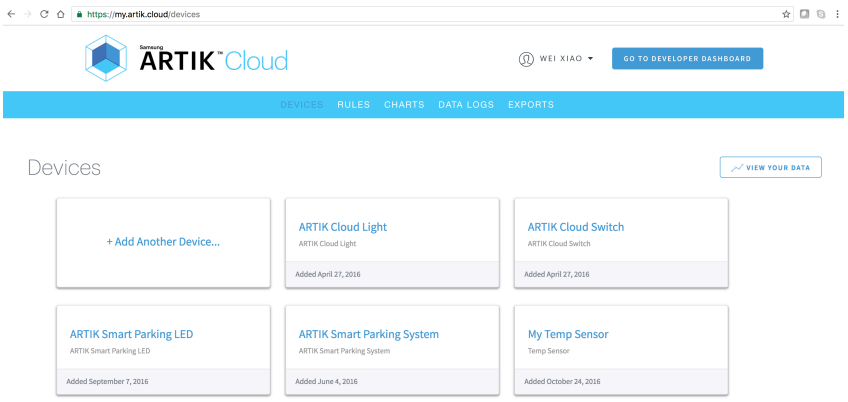
Click “Add Another Device…” link.

4.2 Search for “Temp Sensor” and select it.

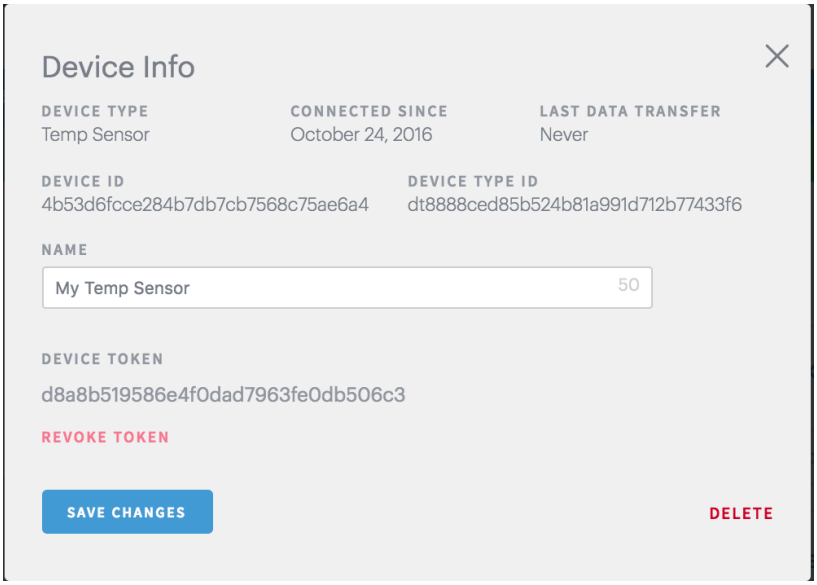
“Temp Sensor” is a public device type which you can inherit. Name your instance as “My Temp Sensor”.



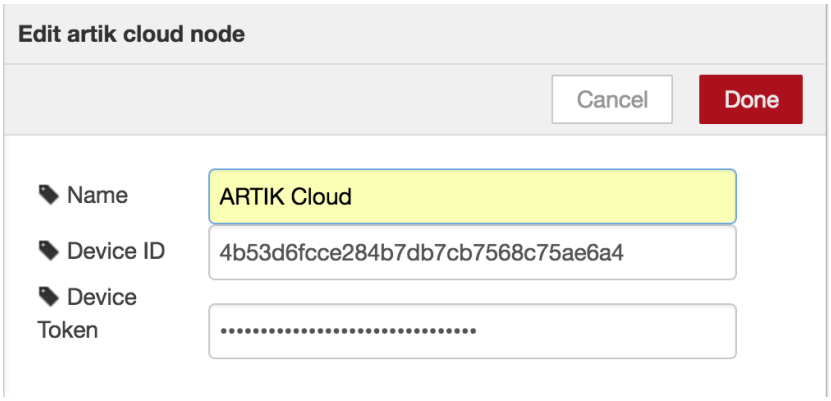
4.3 Click the “CONNECT DEVICE…” button. A new device will be created.



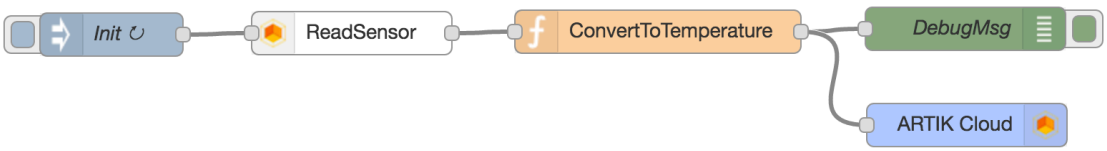
4.4 Click on newly created “My Temp Sensor”, you will see the Device Info popup, which shows your Device Type, Device ID, Device name etc. details. Click the “GENERATE DEVICE TOKEN…” link to generate a device token.



5. Now, let’s go back to our Node-RED flow and plug an artik cloud out node to into our existing flow. In the artik cloud out node, we will enter our Temp Sensor instance device ID and device Token.



The final flow looks like:

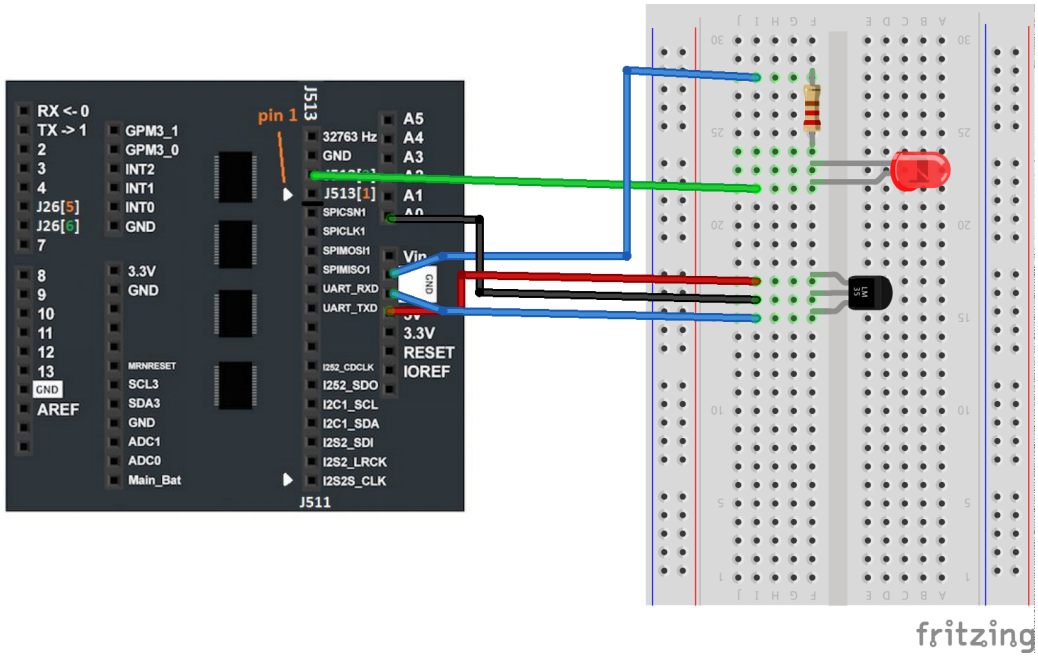


6. Go back to ARTIK Cloud user portal, you can visualize the streamed temperature data.

Example 3: Use Rules Engine to control LED

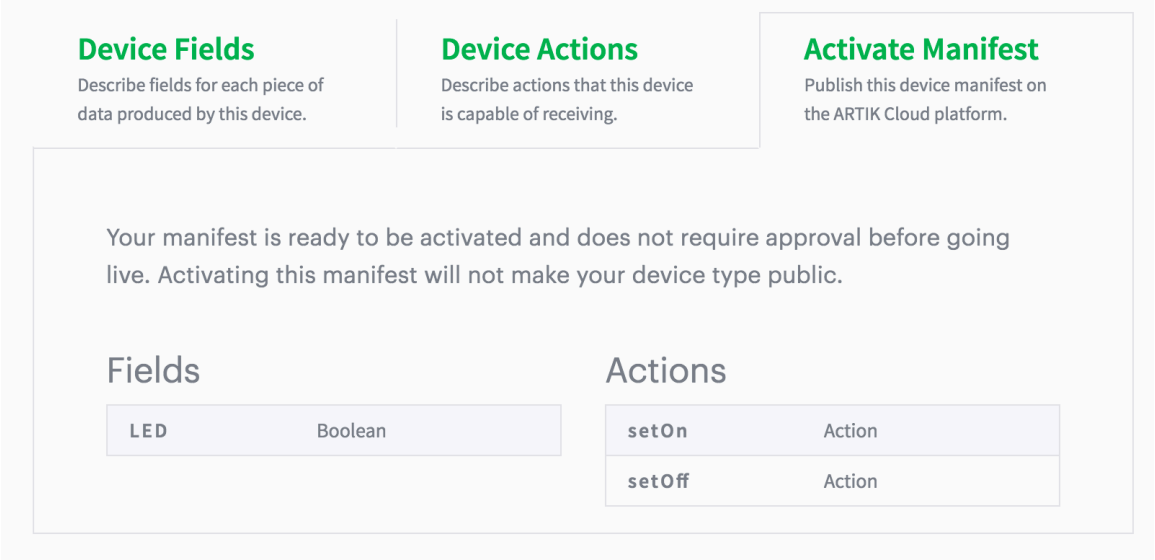
In this example, we will extend what we developed in Example 2. We will have the temperature sensor and an LED connected to our ARTIK 5 board, and use ARTIK Cloud Rules Engine to trigger cross-device actions.

Building the circuit



Adding Rules in ARTIK Cloud

1. From ARTIK Cloud developer portal, we create a new device “ARTIK LED”, which has a Manifest like below:



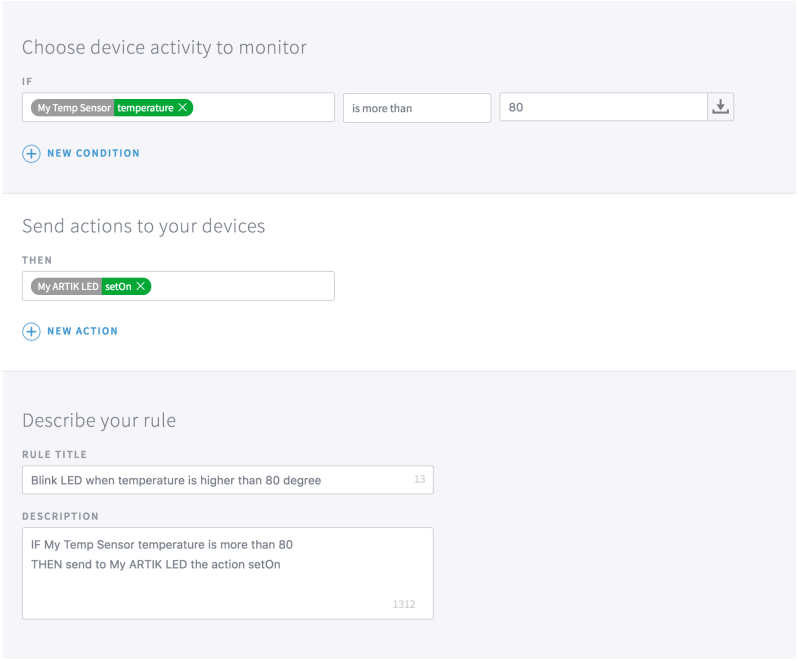
We will use its “LED” field to track if the LED is ON or OFF, and trigger setOn, setOff actions by using Rules Engine.

2. Create an instance of “ARTIK LED” device from ARTIK Cloud developer portal by following the same steps from Example 2. Name your device instance “My ARTIK LED”, and get a copy of your device ID and device token.

3. As the next step, we will add rules so “My Temp Sensor” can turn on or off “My ARTIK LED” when certain conditions are met.

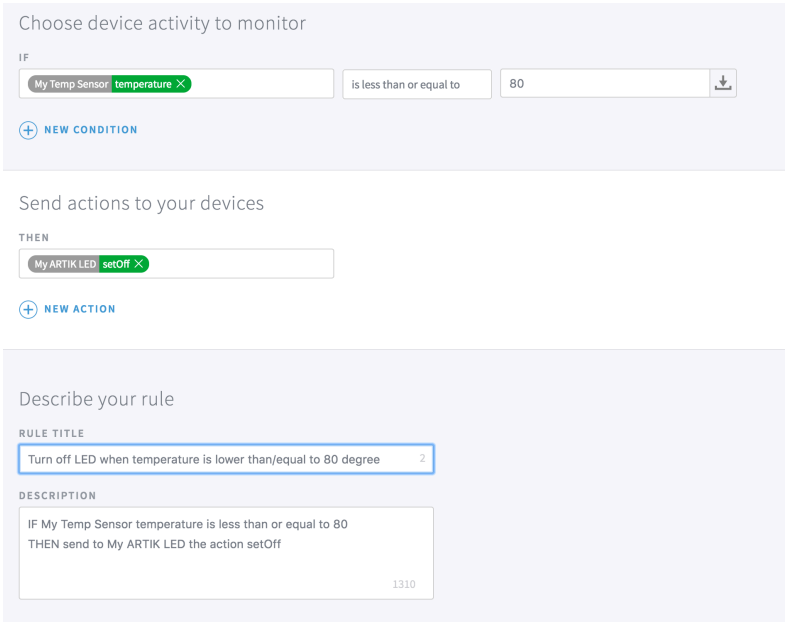
Go to ARTIK Cloud user portal, select Rules, and click “+NEW RULE “ button. Or first rule is:

```
IF
My Temp Sensor temperature is more than 80
THEN
Send to ARTIK LED the action setOn
```



Add a 2nd rule:

IF
My Temp Sensor temperature is less than or equal to 80
THEN
Send to ARTIK LED the action setOff

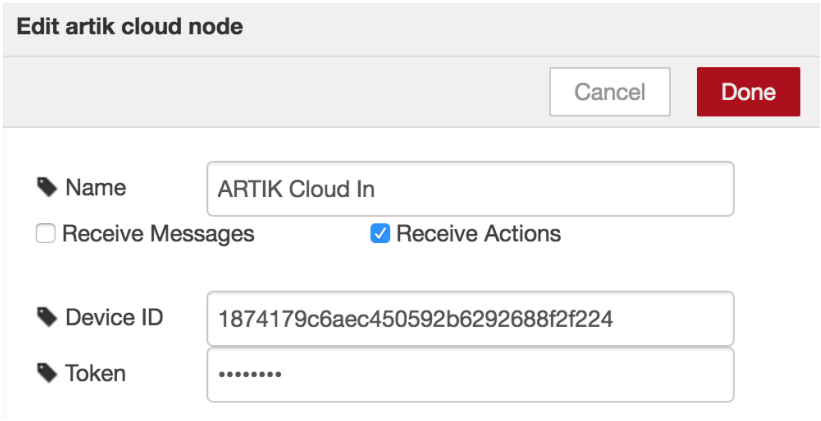


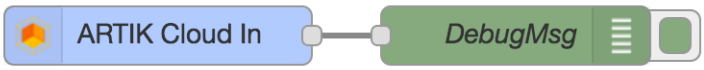
Developing Node-RED flow

1. Drag an “artik cloud in” node and a “debug” node to the canvas, and wire them together.

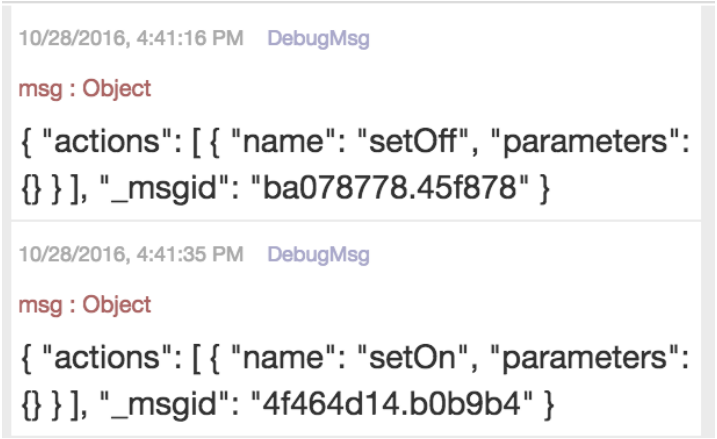
2. artik cloud in node is capable of receiving both messages and actions. In this example, we will configure it to receive actions triggered by “My Temp Sensor”. Double click the node, select “Receive Actions”, and enter your “My ARTIK LED” device’s device ID and token. Name the node as “ARTIK Cloud In”.

In debug node, change the output to “complete msg object”.

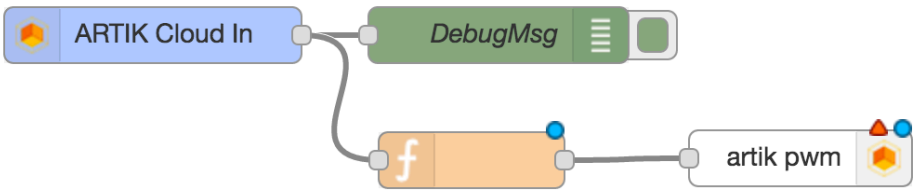




3. Now warm up the temperature sensor, and when the temperature fluctuates, you should be able to see debug messages like below from the Debug Panel:



4. Drag a function node and an artik pwm node to the canvas and put them under “DebugMsg” node.



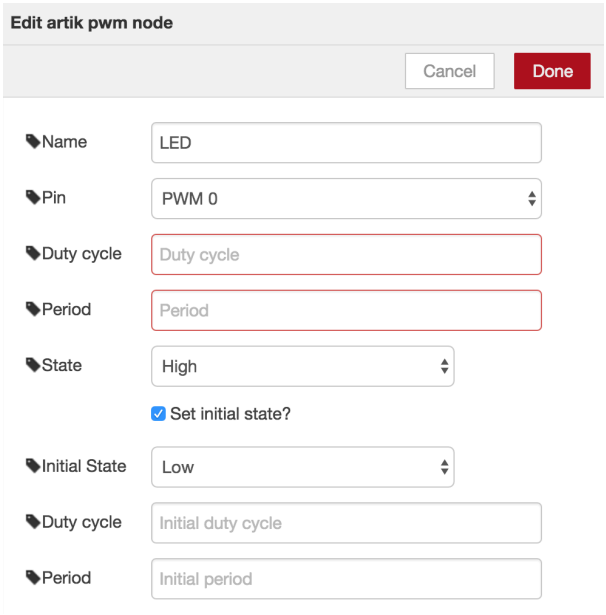
In “function” node, we check if we received a “setOn” or “setOff” action. When LED is ‘setOn’, we define msg.payload.state to be 1, msg.payload.dutyCycle as 500000000

```
var actions = msg.actions;
var action = actions[0].name;

if (action === 'setOn') {
    msg.payload = {
        "state": 1,
        "dutyCycle": 500000000,
        "peroid": 1000000000,
    };
} else if (action === 'setOff') {
    msg.payload = {
        "state": 0
    };
}
return msg;
```

(500ms), and msg.payload.peroid as 1000000000 (1s), and use them as PWM parameters for artik pwm node.

When LED is ‘setOff’, we simply set msg.payload.state to 0 to turn off the PWM output. In ‘artik pwm’ node, our configuration looks like below:



Now, when your temperature reaches over 80 degree, you should see your LED blinks.