1. Set Up A Node-RED Dashboard To Subscribe To A Broker For Sensor Data
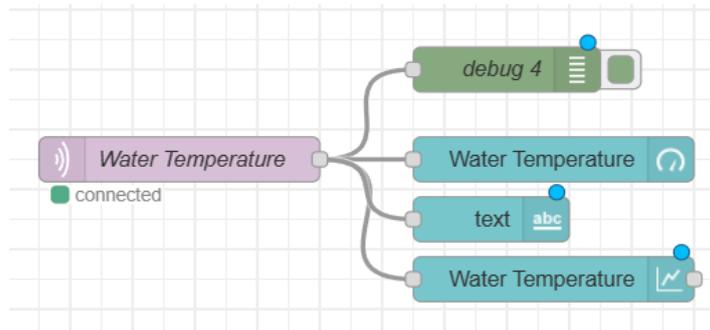
Begin by launching Node-RED instance and accessing the flow canvas.

1. Configure the MQTT In Node:

Drag an MQTT In node onto the flow canvas. Double-click the MQTT In node to open its configuration dialog. In the configuration dialog, establish a connection to the MQTT broker. Enter the details for the server and topic under which the water temperature data is being published. Rename this node "Water Temperature" for clarity and Click "Done" to save the MQTT In node configuration as follows:
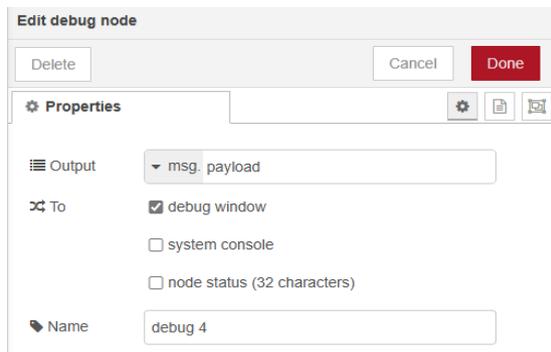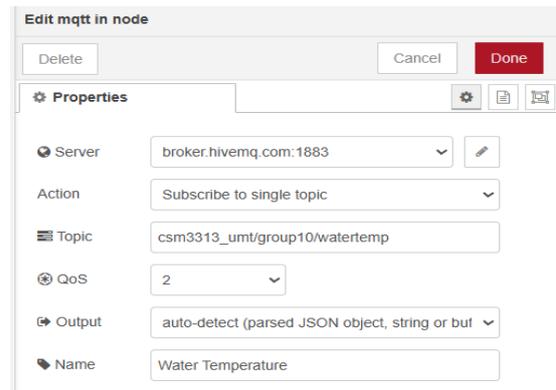
2. Set Up the Debug Node:

To help with debugging and verifying incoming data, drag a Debug node onto the flow canvas from the palette. Connect the output of the MQTT In node to the input of the Debug node. Double-click the Debug node to configure it. In the dialog, ensure that it is set to display the entire message payload. Click "Done" to save the Debug node configuration.

3. Create a Dashboard Gauge:

To visualize the water temperature data on the Node-RED dashboard, add a Gauge node from the dashboard category on the left. Connect the output of the MQTT In node to the input of the Gauge node. Configure the Gauge node by double-clicking it. Set it up to represent the temperature data appropriately. Create a new dashboard group or choose the existing group. Define the range of values for temperature sensor and sectors, then label the Gauge node as "Water Temperature" to make its purpose clear. Click "Done" to save the Gauge node configuration.
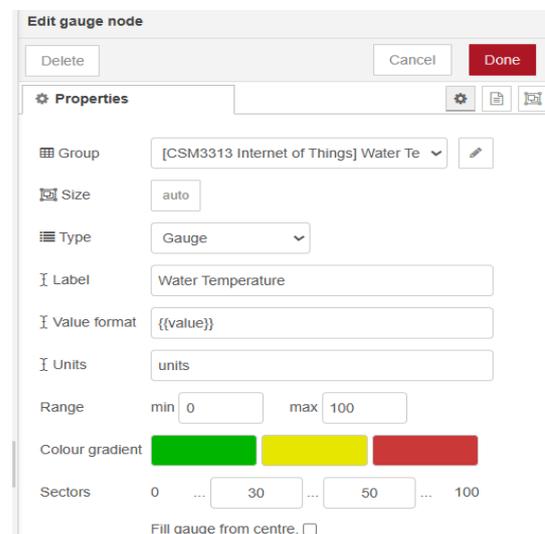
4. Add a Dashboard Text Display:

To display the temperature data as text on the dashboard, add a Text node from the dashboard category onto the flow canvas. Connect the output of the MQTT In node to the input of the Text node. Configure the Text node by double-clicking it. Set it up to display the temperature data as follows and click "Done" to save the Text node configuration.
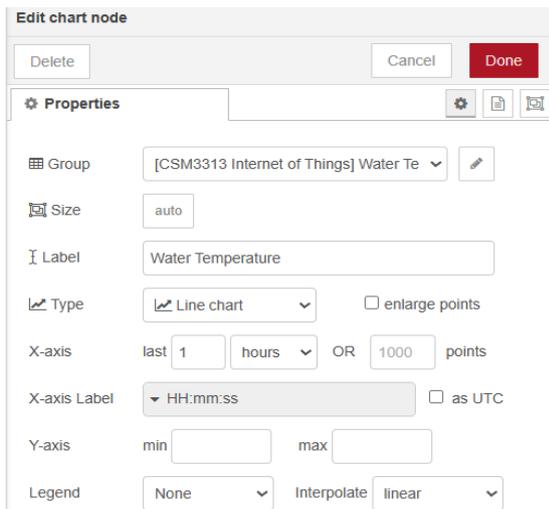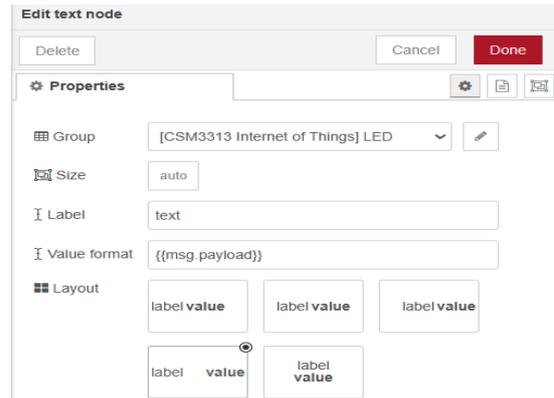
5. Implement a Chart Node:

To create a time series graph of the temperature data, use a Chart node from the dashboard category. Connect the output of the MQTT In node to the chart node and configure the node as follows:

2. Set Up A Node-RED Dashboard To Publish Data To A Broker For LED Control
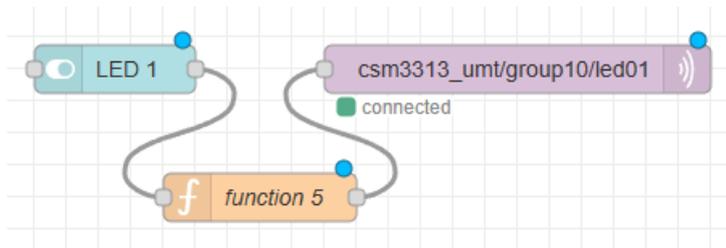
1. Add a Switch Node:

Drag a switch node onto the Node-RED canvas. This will be the control for sending LED commands. Configure the node by setting its properties such as group, label, topic, and payload to correspond with the LED state to control as follows:
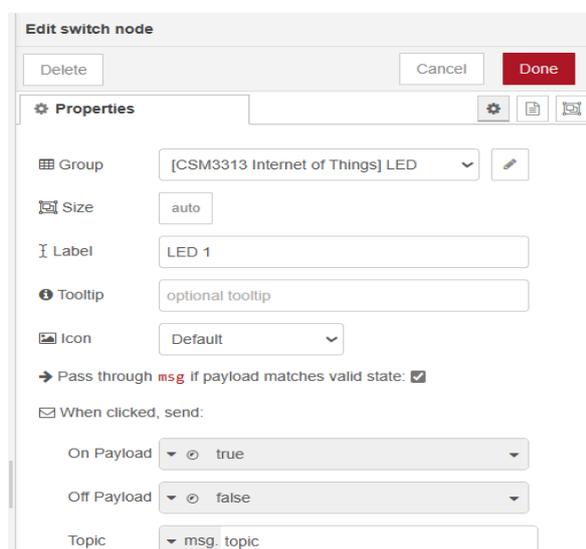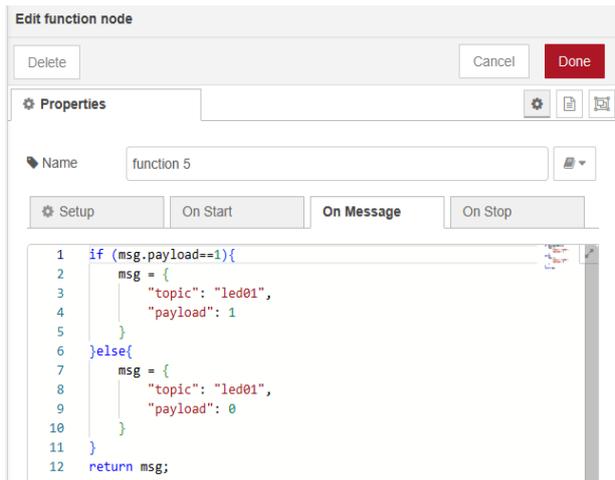
2. Insert a Function Node:

Place a Function Node on the canvas to define the logic for the LED control message. Double-click the Function Node to open its configuration and write the JavaScript code needed to process the incoming message from the dashboard node as shown in the image. This code will format the message payload as required by the LED control mechanism. Connect the output of the Switch Node to the input of this Function Node.

3. Set Up the MQTT Publish Node:

Add an MQTT Out Node that will handle publishing messages to the MQTT broker. Open the configuration for the MQTT Out Node and specify the MQTT server details along with the topic that the LED is subscribed to, such as "csm3313_umt/group10/led01". Ensure that the MQTT Out Node is correctly connected to the broker by checking for a "connected" status once configured. Link the output of the Function Node to the input of the MQTT Out Node.
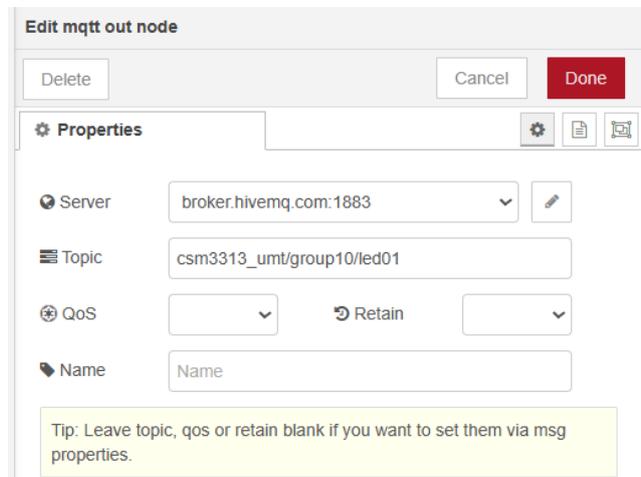
3. Deploy the Node-RED Flow
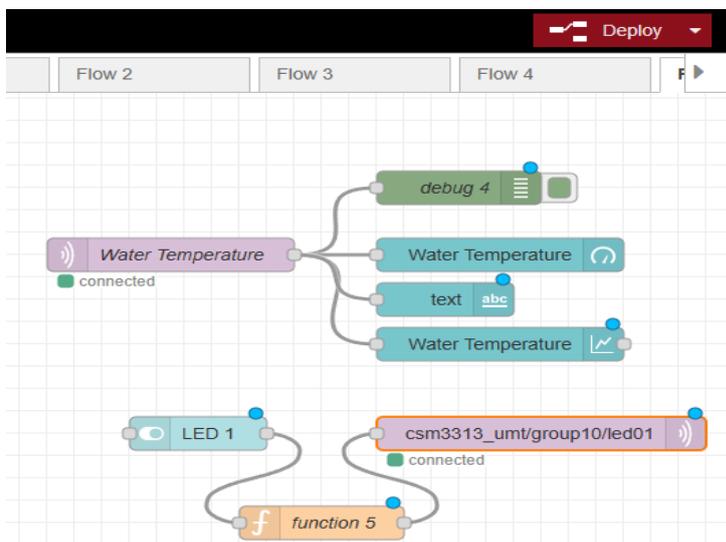
Once all nodes are configured and connected, click the "Deploy" button in the top right corner of the Node-RED interface to activate your flow.

4. View the Dashboard

Access the Node-RED dashboard by clicking the dashboard tab in the Node-RED interface or by navigating to the dashboard URL.
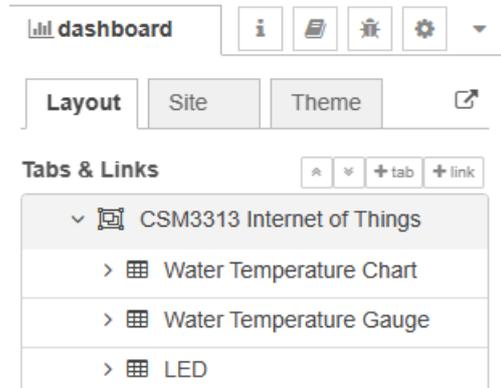
Observe the temperature data on the gauge, text display, and chart as it updates in real-time.