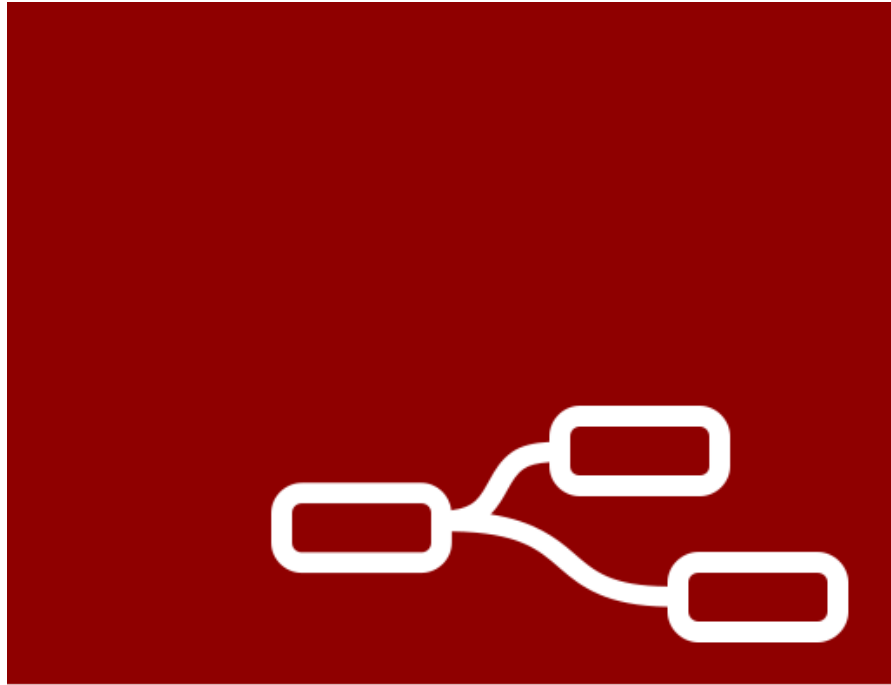


Advance Node-Red



Node-RED

Semester 4 HMI

HMI Challenge

April 13, 2023.

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Course: Smart Industry

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Acronyms

<i>Acronym</i>	<i>Meaning</i>
<i>HMI</i>	→ Human-machine Interaction and Control
<i>ESP32</i>	→ Expressif32

Table 1 – List of acronyms used throughout the report

Introduction

The assignment on which this document presents a small challenge of HMI subject. HMI also known as Human-machine Interaction and Control is a subject for semester 4 where we learn how to develop modules which humans are using to either interact, monitor and/or control a machine, process, data, etc. These are then displayed in a dashboard to create an insight of what is happening in a smart industry. In the following sections will provide the procedure and conclusion of the assignment.

Procedure

In this assignment, will be an extension of the orientation phase Node-Red. The flows and nodes will be more advance where there will be data being sent and received by both the hardware and Node-Red. The requirements will be more complex and the dashboard will be more interactive with data insights.

To meet these requirements, I created a solution to use the ESP32 with the DHT22 to gather data and set it in the dashboard to visualize the data. I created two separate topics for the temperature and humidity to gather the data and for the temperature, I made some extension where it will receive a notification if it reaches the value threshold. (See figure 1)

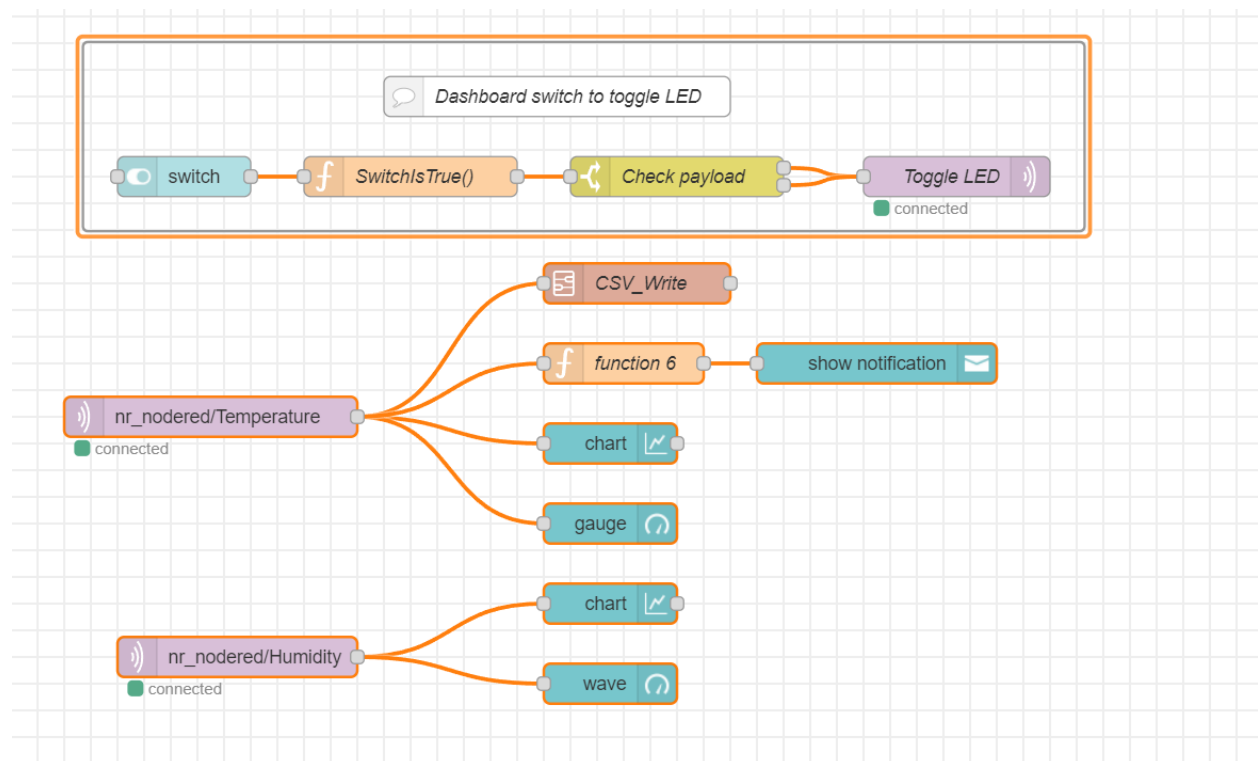


Figure 1 Node-Red Flow

As you can see in the figure above, I created a UI switch node for the dashboard. This node allows me to be able to send boolean values to a function node and then to a switch node. This switch node allows us to receive a value and with that value we can have different outputs depending on the value received. In this case we only have 2 values and these will be sent to ESP32 through an MQTT node and the values received will either turn on/off the onboard LED.

In figure 2, I created a sub flow to send the data received to a CSV file for future configurations. The temperature data is converted into json and aligned to CSV format and finally connected to a write node to add the values to a CSV file stored locally on the PC. Lastly, I added input to connect the output of the temperature node and an output for debugging purposes.

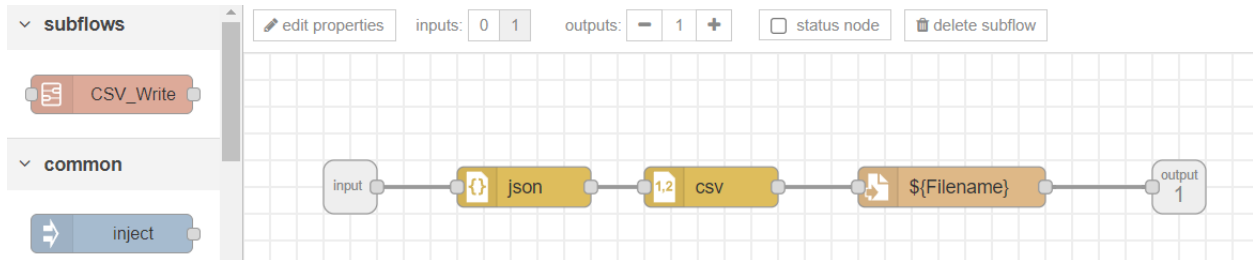


Figure 2 Node-Red Sub flow

In figure 3, you can see the outcome of the flow that I created in the dashboard. The dashboard has a LED switch to toggle the onboard LED and visualization to visualize the incoming data from the ESP32. I chose these visual nodes to display the value for users to see it in detail and more simple.

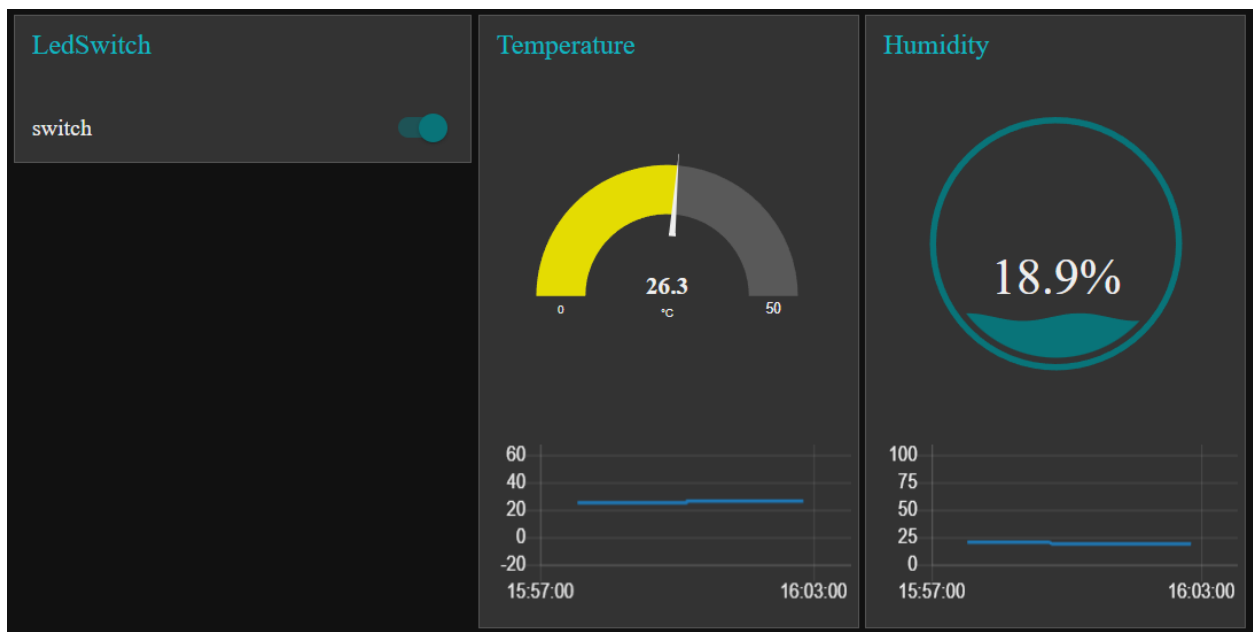


Figure 3 Node-Red Dashboard

Conclusion

To conclude this assignment, I have learned new information and I am able to extend my knowledge in creating dashboard. I was able to create advance flows and manipulate the data shown in the dashboard. Unfortunately, due to lack of research and dashboard design creativity, I am yet to be able to create a good dashboard for displaying the right information. This assignment shows how far I have reached and with the teacher's feedback, I am able realize what should a user wants to see on the dashboard. With all things considered, the learning outcome of the assignment was a success and will be improved in the next assignment.

Reference

Node-Red Dashboard tutorial (2017) *YouTube*. YouTube. Available at: <https://www.youtube.com/watch?v=X8ustpkAJ-U> (Accessed: April 14, 2023).

Subflows (no date) *Node*. Available at: <https://nodered.org/docs/user-guide/editor/workspace/subflows> (Accessed: April 14, 2023).