

LELEC2811 - %RH measurements for tropical plants greenhouse

Context and conditioning chain specifications

Context

In this mini-project, your customer is a manufacturer of greenhouses for exotic plants. The system will be designed to regulate several parameters like temperature, humidity and moisture levels inside the greenhouse to enhance the growing of the plants. To this end, several sensors are placed inside the greenhouse to perform the required measurements. Acquired data will then be digitized and send to a micro-controller to take decisions about the monitoring of greenhouse parameters. For instance, if the humidity level is too low, the micro-controller will give the order to increase humidity by turning on a humidifier. The flowchart of the whole system is represented in Figure 1.

You are responsible for the design of the humidity (%RH) sensing chain, from the raw sensor up to the digitization.

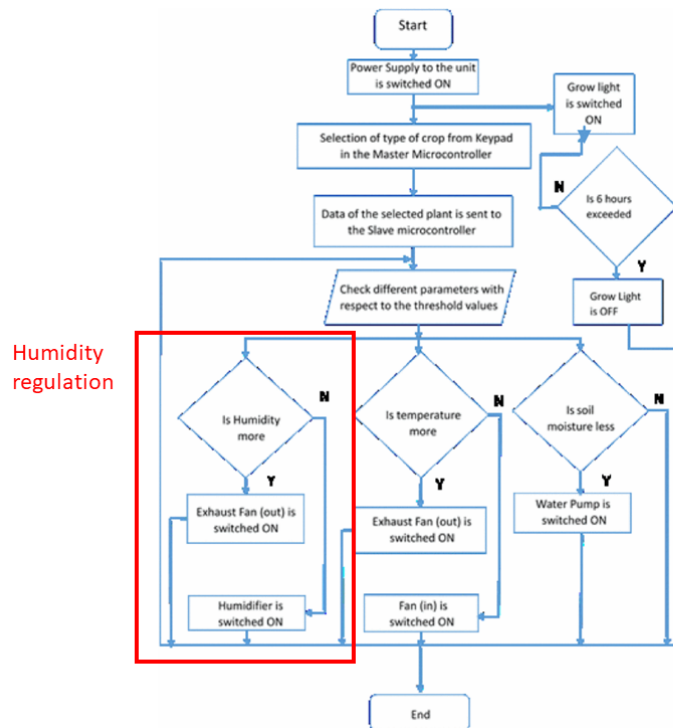


Figure 1: Flowchart of the greenhouse parameters regulation system [1].

Specifications

For this application, the type of signal that you will digitize will depend on the conditioning chain as the raw sensor will be a capacitor.

- %RH span: from 40 to 100 %RH [2].
- Bandwidth: <1 Hz
- Temperature dependence: must be resistant to temperature variations in the greenhouse. T° for exotic plants should be between 15 and 30 ideally [2][3].
- Supply voltage: <3.3 V
- Accuracy: <5%

Available sensors

Three different raw capacitive sensors can be used to develop the prototype :

1. HS20 (datasheet: 2616423.pdf)
2. P14 SMD-G (datasheet: 484562.pdf)
3. EFS-10 (datasheet: datablad-156545-b-b-thermo-technik-vochtsensor-1-stuks-con-efs10-meetbereik-20-90-hrel-b-x-h-5-mm-x-10-mm.pdf)

References

- [1] S Akhila; Shriya Nithyan; C Sowmya; B. K. Priya, Design and Implementation of Real time monitoring Using Arduino based Indoor Artificial Environment, 2019 International Conference on Communication and Electronics Systems (ICCES)
- [2] Green Home Gnome (September 30, 2014) , 7 Tips for Growing Tropical Plants in a Greenhouse, <https://www.greenhomegnome.com/tips-growing-tropical-plants/>
- [3] Krostrade, Température idéale pour cultiver des tomates dans une serre, <https://krostrade.fr/fr/blog/post/temperature-ideale-pour-cultiver-des-tomates-dans-une-serre>