CASE STUDY

INDUSTRIAL SHIELDS

COMMUNICATIONS FOR 4.0 INDUSTRY

In this case we want to show you how to implement a versatile system in terms of communication to control the storage and labeling of wine production.

This project consists of using different PLCs connected using several types of communications.

SUMMARY

We work with a wine factory that needs to control and monitor two rooms:

- In the first room, there is the bottle labeling and engraving line.
- The second room is the cellar where the bottles are stored for later sale.

To transport the bottles from one place to another, we will need to implement a conveyor belt system capable of redirecting the bottles on different belts depending on the capacity of the racks.

Our system will incorporate a **server** where all the data collected from the system will be stored, a **Panel PC** that will serve as a monitoring and control point and **four Arduino based PLCs**, in addition to **sensors** and **peripheral devices**.

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IMPLEMENTATION

The whole system will be controlled by the master PLC that will be in charge of controlling the other three slave PLCs through LoRa (wireless radio frequencies communication protocol). This PLC will continously send the process information to the server using an ethernet connected router and then transfer it, in real time, to the Panel PC (control point)

The PLC nr. 2 will control the conveyor belts. Let's imagine that there are 5 belts to be controlled. The first one will be in the labeling and engraving line, the second one will take the bottles from this station to the storage area where they will be derived by 3 other conveyor belts depending on the capacity of the racks. If the first rack is full, the first conveyor will stop and the second one will turn on to fill shelf nr. 2 and so on continuously. This system can incorporate an unlimited number of conveyor belts depending on the capacity of the warehouse. This PLC will be an M-Duino 57R + since it has relay outputs that can activate monophase 220V engines that carry the conveyor belts.

The PLC nr.3 will control both machines, the labeling machine and the engraving one. So the labeling machine will communicate with the PLC through the RS-485 protocol since it is the most common in the market for this type of devices. The laser engraver could communicate with the same protocol, but we can take advantage of the versatility of the Industrial Shields equipment, doing it via Bluetooth, thus avoiding physical wiring. The equipment chosen for this application will be an M-Duino 21+ WiFi / Bluetooth.

Finally, the PLC nr. 4 will be in the warehouse where all the bottles on the conveyor belts are stored. In this case, the customer has asked us to control the temperature and humidity of the cellar so that the wine is kept in optimal conditions. In the racks we will install photoelectric sensors that will indicate the capacity of the shelves, in case they are full we can communicate it to the PLC nr.2 and activate the second conveyor belt to fill the second rack. To control the climate there will be a temperature and humidity sensor and depending on the selected parameters, we will turn on the dehumidifier and the air conditioning. Apart from seeing these parameters on the Panel PC we have installed a small LCD screen in the warehouse where we can also see them. This screen will be controlled through I2C, which is a very usefull protocol for this type of application. The PLC which will do this task is an M-Duino 19R+, also with relay outputs to activate the dehumidifier and the air conditioning.

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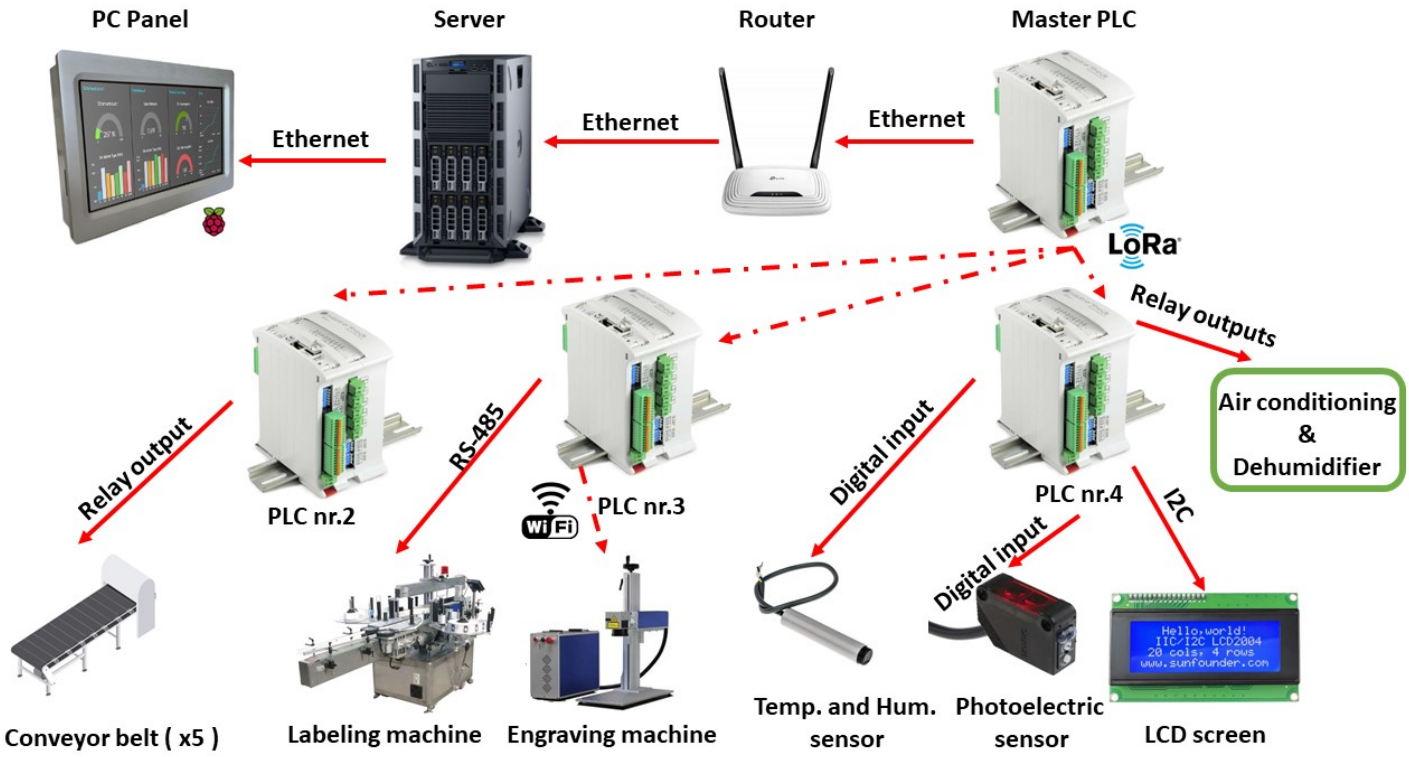
CONNECTION LAYOUT

This system can be easily replicated for any winery or bottling plant, adding elements depending on the needs of the system and extending it to several rooms or industrial warehouses since the LoRa communication has a range of more than 15km, thus creating a very wide network of controllers.

With this example we have seen the importance of the most innovative communications of Industrial Shields and also its effectiveness in terms of implementation since they are predefined and there are own libraries with example codes which makes programming simple apart from being Open Source.

Below you can see the assembly scheme of the system:



Industrial Shields