CASE STUDY

INDUSTRIAL SHIELDS

CONTROL & MONITORING OF AN OIL WELL

In this case study, we will introduce the Industrial Shields' technology to the oil sector. We are going to control and monitor an oil well using a PLC and sensors connected wireless to the cloud.

SUMMARY

Why did we think of this application?

The main reason is because it is very interesting to show our costumers the capacity and effectiveness of our equipment to be used in any type of environment in addition to the communicative versatility that allows us to collect information from the devices without having to be on the site.The programming of the process will be done with the open source application Arduino IDE, since the heart of the PLC is an Arduino Mega board.

The variables that we are going to visualize in an oil extraction process are basically:

- The oil temperature.
- The pressure and the flow rate with which it is extracted, which can be very useful for forecasting production.
- Possible damage to the probe.

GOAL

As we mentioned before, we want to visualize those process variables that will be provided by the sensors. We will use the Bluetooth module of the PLC to receive this information without wires, and later we will send it to the cloud via GPRS. The data will be processed by an online application that will monitor the process. In addition, it would be interesting to program a series of alarms for critical levels so as not have to be constantly consulting variables.

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CONCLUSION (HARDWARE)

The PLC will control the three sensors that we need: pressure, temperature and digital flowmeter. These sensors will provide us with 10-bit analog signals (0 - 1023), which will be later converted to the unit of measure by program. The connection between the PLC and the devices will be by Bluetooth. Periodically, the PLC will read the peripherals and send the data to the cloud, which the application will access to collect real data and display it on the screen. When one of the sensors reaches a critical level, it will activate an alarm that will give us the option of stopping the process or slowing it down remotely. In order to be able to act on the system, we need to include an emergency stop and another button that will slow down the extraction speed. These controls will be virtual so we will read by program if the button has been pressed or not, a condition that will arrive via GPRS.

From this model we could multiply it and create a network of wells in different regions and even countries and have a centralized control of all of them. We could also make a study of all the data collected and create a calculated trend in each region to see where the most frequently failures in the system occur and thus be able to anticipate solutions.

The way we have connected the devices and the fact of transmitting the data to the cloud makes the project become an IoT application.

Finally, in the following scheme can see the distribution of the devices.