



CASE STUDY

INDUSTRIAL SHIELDS



BIOGAS PLANT AUTOMATION AND MONITORING

Biogas is a fuel gas generated in natural environments or through specific devices, due to the biodegradation reactions of the organic material. It is produced by the action of microorganisms and other factors, always in the absence of oxygen .

Biogas plants take advantage of that and treat the biomass to produce energy. These plants have a lot of machines like fermenters, agitators or multiple kind of meters, successfully complete each part of the process.

CHALLENGE

Our customer's purpose is to centrally manage and monitor all steps of the biogas creation method. This will involve the following sections:

- Implementation of the control system and the plant automation.
- Installation of a screen for local control and management of the machine.
- Implementation of sending data to the cloud.

IMPLEMENTED SOLUTION

The biogas plant is divided into four parts, each of which is responsible for a different process:

- The substrate input including the anaerobic digestion
- Nitrogen removal
- Effluent extraction
- The use of biogas to produce electric and thermal energy

The management is carried out by a **Raspberry 58+ PLC** due to the extensive number of digital and analog I/Os available, the Ethernet and Wi-Fi communications among others and, especially, to its high processing capacity, capable of developing multiple processes simultaneously providing a high response. A **TouchBerry Panel PC** monitors the information due to:

- its easy integration and communication with the PLC
- its high performance.

The sending of data to the cloud is done through the Ethernet connection, used to communicate with the server with a high speed interaction.



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The customer's main objective is to **process biomass waste** that may have a vegetable or animal origin. This waste is placed in the anaerobic digestion module where biogas is created after a certain period of time. This biogas is implemented in an engine which is used to produce thermal and electrical energy.

A part of the waste from the anaerobic digestion module is sent to a nitrogen feed reactor, and the other part is sent to an operating accumulation pond. After all these processes, recirculation takes place as the product from the nitrogen feed reactor is sent to the anaerobic digestion module.

The anaerobic digestion module and the nitrogen feed reactor have to be under a heating system to maintain a certain temperature over time, so the customer uses a temperature sensor to achieve this. It is also important to get a real time control of the pressure through another specific probe, so pressure is always a vital parameter to take into account when talking about gas management. For this reason, the customer has implemented other sensors such as sludge probes, air and biogas meters,

each with significant management over and above the overall system.

Another important aspect is the local machine management **display control**. Thanks to Industrial Shields technology, the customer has implemented:

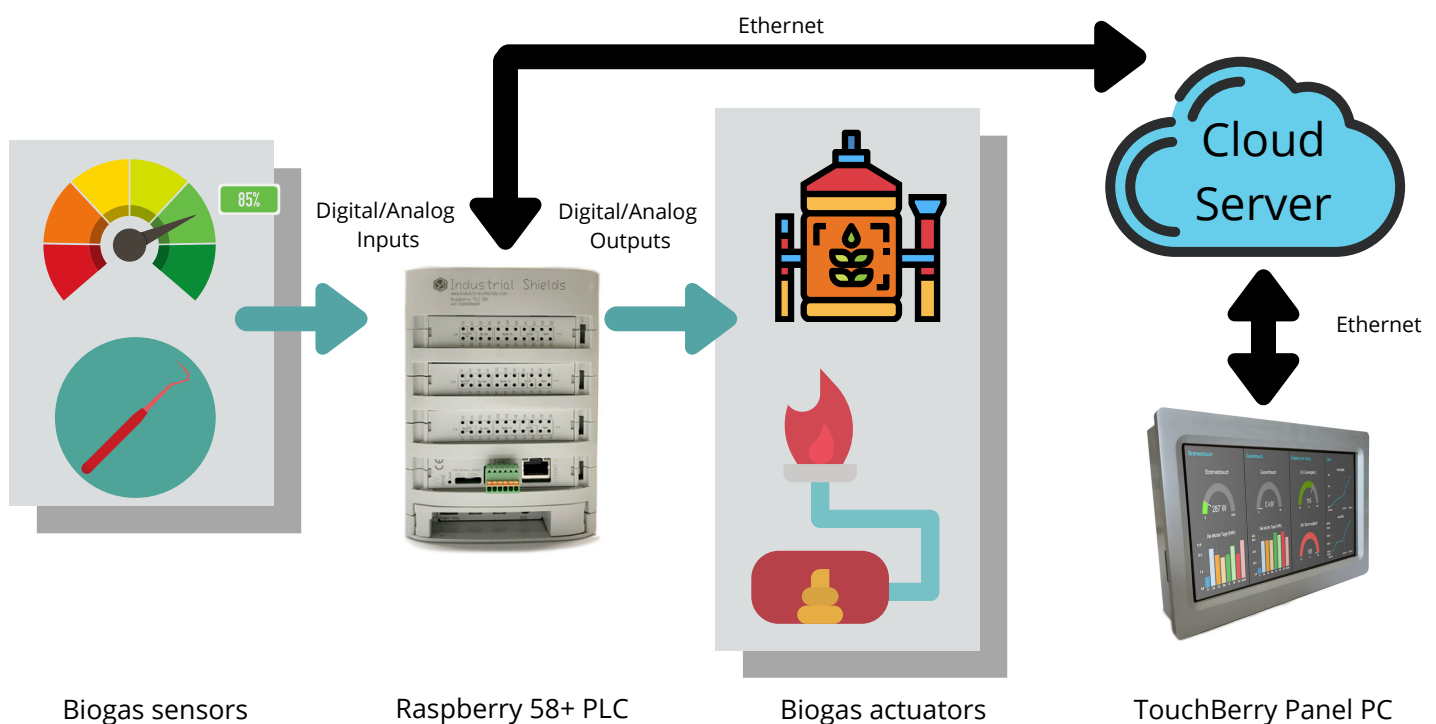
- the monitoring of its plant situation in real time,
- the control over the different operations,
- the visualisation of certain alarms and sensor/actuator history,
- the configuration of all available parameters, and
- the definition of a hierarchy with respect to all possible users of the system.

Finally, **the sending of data to the cloud** is implemented. This process is based on a communication with the server. The chosen method is **Ethernet** due to its higher speed and bandwidth compared to other options such as Wi-Fi or GPRS.

Thanks to the design of an interface, all information is displayed in a convenient way by a **Touchberry Panel PC**.



Thanks to Industrial Shields technology, the customer has achieved its goal by fully automating the system.



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BENEFITS



Good communications

Ethernet communication has a higher speed and bandwidth than options such as Wi-Fi or GPRS.

Thanks to the dual Ethernet ports, the dual RS-485, WiFi, Bluetooth, CAN bus and other options, Raspberry Pi PLC family can connect to a large number of devices and to use multiple protocols and communication ports.



Data monitoring

Information can be displayed on Industrial Shields touch screens, which stand out for:

- monitoring all types of data, such as plant situation in real time,
- displaying certain alarms and sensors history,
- configuring all available parameters,
- processing large data packets due to their high capacities and
- working in many different standard protocols.

WHY INDUSTRIAL SHIELDS?

Industrial Shields won this project and beat its major competitor thanks to:



Open solution. No license fees.



Modular solution: The project can be extended in the future if the client requires it,



24/7 technical support: Our technical team is available to help you 24/7 via phone, mail or WhatsApp.



Equipment designed and manufactured for **industrial use** at a **lower price** than competitive products.