



CASE STUDY

INDUSTRIAL SHIELDS



MONITORING OF BEET MOUNTAINS

The main sugar beet growing areas are in the temperate regions of Europe and North America, with average heat wave temperatures between 16-25 ° C and annual rainfall of at least 600 mm.

Before the beet is processed, its is stacked in huge mountains outside. Although the mountain hold the beets well, those on the inside of the pile are more affected by heat and moisture to the point of damage.

CHALLENGE

Our customer is a major Spanish sugar manufacturer who wanted to implement a system to control and monitor his beet mountains. He realised that the beets at the bottom centre of the mountain were spoiling even before being removed to start the sugar conversion process. As a result, a percentage of the raw material had to be discarded, losing significant amounts of money at the end of the year.

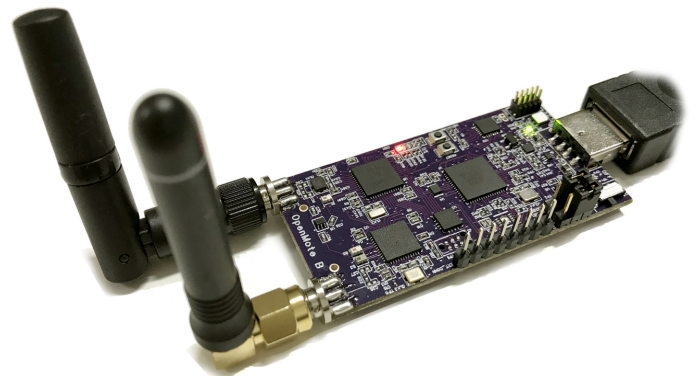
In short, they wanted a system that could detect when the beets were about to start rotting and, therefore, prevent it and extract them in time. It must be taken into account that the system will be outdoors, so it must face possible climatic adversities.



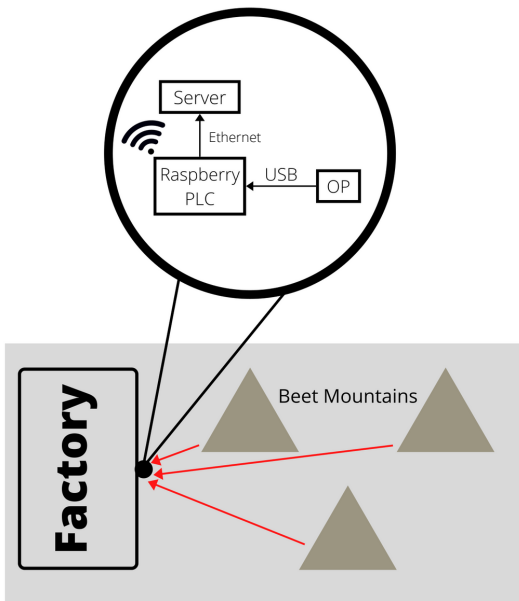
IMPLEMENTED SOLUTION

In order to solve the problem, a system using Industrial Shields devices is applied to monitor temperature and humidity inside the mountains. An Open Mote B connected to the corresponding sensors is implemented in each mountain, sending the collected data to another one that will act as a master.

All the data collected by the master are redirected to a Raspberry PLC that send them via Ethernet or Wi-Fi to a server.



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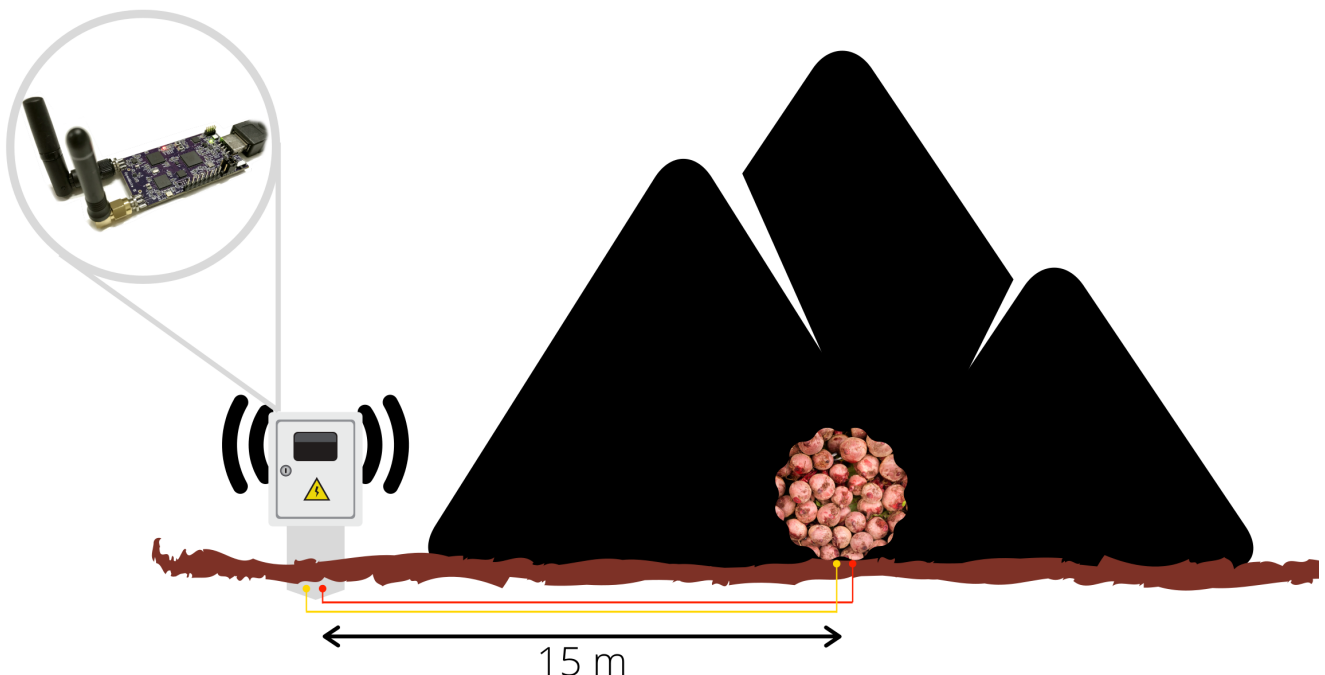
It is essential to control the temperature and the humidity to know if the beets are still in good condition or have started to take root. If a high level of heat and humidity is detected, a warning signal is sent. As the beets are removed with bulldozers, the sensors must be buried underground avoiding the bulldozers levers but still being able to detect the beets.

The Open Mote B uses a DS18B20 sensor to detect the weather information. The Open Mote B will be located outside the mountain, inside an electrica box, while the sensor, as mentioned above, is buried down the mountain within a 15 m radius. As the sensor works at 5v while the Open Mote at 3.3, a level shifter is necessary. They are powered by batteries that, thanks to their advanced hardware, will not be necessary to replace in a period of almost 2 years.

A program will be loaded into the device being able to switch it on from time to time to save energy. As the beets do not take root for a period of

minutes, a signal "wakes them up" every hour to send the actual data to the master by radiofrequency; they can operate using a 2.4 GHz signal (less distance but better data rate) or a 868 MHz signal (more distance but worse data rate).

The Master Open Mote B is located near the factory connected to an Industrial Shields Raspberry PLC via USB connection. The Raspberry PLC sends all the information to an internal database or directly to the cloud via Ethernet or Wi-Fi. In the near future a beacon could be added to the electric boxes where the Open Motes B are located for a visual alert when the levels exceed the limits, so the customer can see them easily.



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BENEFITS



Economic savings

Thanks to the implemented solution, the customer has minimized the economic losses caused by the deterioration of the products.



Guaranteed quality

Control of temperature and humidity helps the customer to keep the product in good condition.



Saving time and resources

Since the product is kept in optimal conditions, it is not necessary to allocate resources to the handling and disposal of products in poor condition.

WHY INDUSTRIAL SHIELDS?

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



Open solution. No license fees.



Wireless system with low energy consumption. The **batteries** of the equipment have a long life.



Modular solution: if the customer requires it, there is the possibility to extend it in the future.



Safety of the installation: being underground, the sensors are safe from damage that could be caused by excavators.



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