Companies: Champiñones Varablanca y CRCibernética

Website: www.crcibernetica.com / www.gridshield.com

Social network outlets: facebook.com/CRCibernetica

National and International Accolades: The project was the winner on the Digital Solution category at the “Costa Rica Verde e Inteligente” Awards (CAMTIC, 2015)

Company Description:

Champiñones Varablanca is located in Heredia, Costa Rica; it is a private Company that produced high quality mushrooms for distribution and consumption in the Costa Rican local market. Nowadays its sales all their production to local restaurants that decided to flip from imported mushrooms to locally produced, because of its quality and competitive prices.

CRCibernética is located in San José and is one of the businesses divisions of the private company Nomadic Solutions S.A. (The other division is known as Griedshield) It is dedicated to the commercialization of open source hardware and research and development for the creation of distinct technological solutions using open source hardware and software.

The Project:

- Description

Open Champi is a technological solution built with open source hardware and software to automatize management and control of weatherization of growing rooms of a mushroom production plant. Its main functions are:

1. Measuring environmental temperatures both internal and external of each growing room and on the composting bags where mushrooms are cultivated and grown;

2. Measuring the environmental humidity both internal and external of each one of the mushroom growing rooms;

3. Measuring carbon dioxide concentration both internal and external on each one of the mushroom growing rooms;

4. Gathering, processing, and presenting all the environmental sensors data by the agronomists and technicians that operate the mushroom production plant;

5. Automatically manage the artificial ventilation equipment, air coolers and heaters, for the automatically weatherization of mushroom growing rooms;
6. Generate alerts about the status of mushroom growing rooms and all of the ventilation, cooling and heating equipment;

7. Providing agronomists with interfaces for manual control of the weatherization of mushroom growing rooms, only when necessary;

8. Providing agronomists with historical and statistical reports about the operative conditions of each one of the mushroom growing rooms to be able to correlate data with the results of the production and make decisions about the optimization of the overall production;

The solution has been customized and built using mainly open source hardware (Arduino and other compatible microcontrollers and electronic sensors) and a variety of open source software modules. Open source hardware and software is a technology designed and created on a collaborative way by thousands of people and communities that freely share their inventions and creations though open dischargeable models, that allows every person or company of the world to use, adjust, modify and distribute freely the technology without limitations or restrictions. The availability of these open source technologies made possible this mushroom automatization plant project.

Currently the project is self-sustaining; it is financed by the operative costs savings and by its production maximization.

- Executing period:

The plant construction started on 2013 by the Company Champiñones Varablanca. CRCiberetica participation took place between 2014 and 2015 with the development and operation of the solution modules, those that are operating right now at the mushroom production plant at Varablanca, Heredia.

- Target:

Every agricultural production plant that requires automatization and control of the environmental conditions.

- Impact

This project has national and international relevance from various perspectives:

1. It can be applied to any other mushroom production plant either in Costa Rica as well as all over the world, especially on processes of developing tropical countries where most agricultural processes are still crafted or handmade;

2. It can be adapted to the production of other agricultural processes, also of developing tropical countries;

3. It propitiates the substitution of mushroom imports with a fresher product with a better quality with competitive pricing;
4. Because the ICT use in agriculture made that industry a lot more competitive, propitiating an economic growth of the country.

Without this solution, the mushroom plant would not have been viable for an affordable and quality production compared to mushroom imports from other markets, especially from China. The alternative of buying from a worldwide well-known provider of integral solutions is out of the company’s financial reach. That is why it was chosen to take advantage of open source hardware and software to create a local customized solution to satisfy local needs.

The solution has been built jointly with agronomists and engineers from Campiñones Varablanca S.A., as well as electronic and computing engineers from CRCibernetica. Without the joint work and direct contact with the final costumer of the solution and without the conformation of an interdisciplinary team, the design and implementation of the solution would not been viable.

- Problem or need that the project tries to resolve

The mushroom production requires weatherized rooms with environmental conditions strictly controlled: humidity, temperature, carbon dioxide concentration in the air, air speed, among others. Worldwide, integral technological solutions already exist in order to attend the mushroom production, provided by automatized systems of big brand names. However, those solutions have three big inconveniences that made them non-viable for this company:

1. They are not designed nor are suitable for the mushroom production conditions in Costa Rica;
2. The acquisition cost is non-viable for the company;
3. Its adjustment cost, implementation, maintenance and support from their country of origin to Costa Rica made them even more un-viable for the company.

The solution created by CRCibernetica was customized and built in order to meet local specific needs so it can allow automatizing the measuring, monitoring, control and the management of the mushroom production weatherized rooms. Exclusively using technologies with open licenses, free and without any cost. Without the availability of these open source technologies, the automatization of the mushroom plant would have been financially un-viable for the company.

**Inventive Level of the Project:** It is radically innovative because the market does not have this kind of solutions that are appropriate and with a viable cost. The solution turned this mushroom growing plant a viable and competitive business.