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Modulo Agrometeorologico M-39

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Abstract: ***The following work exposes the creation of a module agrometeorological based on Arduino technology, whose data are obtained by sensors of temperature, humidity and in turn know the virtues of production that an intelligent greenhouse offers. The Agrometeorological module is formed by two sensors, the main sensor is a dht11 with which we obtain the variables such as: temperature and relative humidity, the secondary sensor FC-28 gives us the soil moisture. The main interface, consists of a microcontroller (ARDUINO), which helps us to interpret the analogue reading collected by the sensors, all this storing on a micro SD card. Nowadays the cultivation in greenhouses is one of the main suppliers of diverse products, due to the climatic change, which leads us to the development of artificial environments within the greenhouses. This creates the initiative of a system for the acquisition of humidity and temperature data by students of the engineering career in industrial maintenance of the Technological University of Tlaxcala. As a base point is the programming made using the Arduino IDE, supported by a library implemented in the C++ language***

Keywords: Intelligent Greenhouse, Climate, sensor

1. Introduction

A free hardware is a plate-based component with a microcontroller, designed to facilitate the use of electronics in basically simple projects. Nowadays, accessibility to new intelligent technologies is greater, which could help in different areas of the labor field.

This instrumentation system consists of two parts: an Arduino (Datalogger) and a computer program. The Arduino (Datalogger) is responsible for collecting the measurements of the variables Agricultural greenhouse, them in an SD module that acquires variables using sensors such as DHT-11 and FC-28, while the computer program serves as an interface between the microcontroller and a PC.

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2. Literary Survey

Protected agriculture is defined as a series of techniques or production systems that allow to modify the natural environment in which the crops are developed, to achieve optimal plant growth, the first greenhouses of Horticulture were built around 1850 for the cultivation of grapes. It was found that growing in heated glasshouses and with the highest level of glass increased yield, plants grew faster when given more light and when the warm environment was constant. This means that other products that could only be cultivated in warm countries if there are no greenhouses can be cultivated in the Netherlands.

Definition of the problem

Currently there is a high range of greenhouses whose main function is the cultivation of vegetables for the consumption contributing to the ecosystem and the economy.

The disadvantage of a greenhouse is the lack of attention and care of a vegetable caused by the lack of personnel trained for the supervision, as a consequence the vegetable does not develop Properly Or just die hurting the job.

It is worth mentioning that nowadays, there are several modules Agrometeorologicos of acquisition of data (Datalogger) with prices of $17.000 until $25.000 approximately preventing thus sometimes the acquisition of these equipment's to the audience.

3. Methodology/Approach

The Agrometeorological module is responsible for detecting the humidity and temperature parameters thanks to the FC-28 and DHT11 sensors, this type of sensors has been designed to receive temperature and humidity information quite accurately in Its readings having a communication interface with the Arduino and storing the data acquired in an SD card.

The DHT11 sensor will be used to capture different readings obtained within the greenhouse.

The DHT11 is a digital temperature and humidity sensor. For your connection with Arduino it is necessary to download and install a library.

In the Arduino connection diagram and DHT11 sensor you can see how to connect the sensor to Arduino, taking into account that you have to incorporate a resistance of 10 k between the data pin and the Sensor Power PIN.

The FC-28 is distributed with a standard measuring plate that allows the measurement to be obtained as an analogue

value or as a digital output, activated when the humidity exceeds a A certain threshold (see Figure 1).

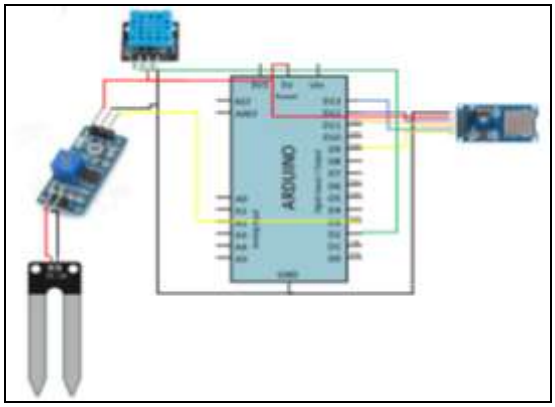

Illustration 1: Connection diagram

4. Results and Discussion

Themodulo agrometeorologico placed in a mulch-type greenhouse, so that in order to properly monitor we use 4 sensors FC-28, as they were placed in the four beds of the greenhouse directly on the ground, also placed a sensor DHT11 which is Positioned in a strategic place to be able to take the moisture data rElativa and ambient temperature (see Figure 2).

Illustration 1: Mulch-type greenhouse

In such a way that depending on the sown plant is the appropriate temperature and humidity to achieve adequate development and the expected results are obtained.

5. Conclusion

With the data obtained from the measurements of each one of the sensors and the behavior the variables. We assure that in such a way that depending on the plant is the temperature and humidity appropriate to achieve an adequate development and the results expected in a good production (see table 1)

Table 1: Parameters for the appropriate development according to the type of crop

PLANTA	HUMEDAD RELATIVA	HUMEDAD SUELO	TEMPERATURA AMBIENTE	TIEMPO DE CULTIVO
Lechuga	60%-80%	Al ser de raíces cortas, la Lechuga no requiere un suelo muy profundo.	Día: 14•C-18•C Noche: 5•C-8•C Max: 30•C Min: -6•C	25- 60 días
Rábano	90%-96%		18•C - 20•C Max: 30•C Min: 5•C	28- 30 días
Brócoli	95%-100%		Planta: 20•C - 24•C Flor:10•C-15•C	60-100 días
Cebolla	60%-70%		13•C-24•C	4 meses

6. Future Reach

To generate microclimates for greenhouses, because it gives the opportunity to improve the production and the development of crops in greenhouses, offering a product of excellent quality.

The project that arises in the article covers the needs mentioned above, because with the current technologies it is possible to obtain a better performance in question of maintenance, monitoring of temperature and humidity at a low cost, since in the agriculture it is It is necessary to emphasize that in the country the automation is not handled at 100%, so it is necessary to It.

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