

PLC Based Greenhouse Automation

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Abstract- *Plants are everywhere around us, Plants need water, nutrients, air, water, light, temperature, space and time to grow. A plant needs both water and nutrients to survive as our human body needs this too. And same as like human being they need water and nutrients in proper proportion to grow, too much or too little can be harmful to plants. Beside water and nutrients plants also need fresh air and healthy soil for its proper and healthy growth, Plant also needs sunlight to grow, light is used as energy for making food, that process is called as photosynthesis, and temperature is important too, different types of plants requires different temperature and climatic conditions. A plant needs air, soil, light, temperature, water and nutrient in proper proportion to grow and hence the crop. To create such favorable environment, PLC based greenhouse automation system designed which will control the measure such as temperature, humidity, light intensity, soil moisture in ploy house that are continuously monitored and controlled using PLC.*

Modern agriculture uses representative model of greenhouse system. The production of the crop plants is independent of geographic locations and the time of year. The greenhouse also shelter for plants, protects them from harsh weather conditions, insects and diseases. It allow the plants to grow under optimum conditions, which maximizes the growth potential of the plants. The quality and productivity of crop plants is highly dependent on the management quality and good management schemes is defined by te quality of the information gather from the greenhouse environmental. The main aim of our work is to design an automated greenhouse monitoring and controlling system which is purely sensor based and can manage everything without human interference. By using the output signals given by different sensor PLC will maintain the appropriate conditions for the proper growth of plants in greenhouse.

Keywords- Air, Automation, greenhouse, Nutrients, Plant.

I. INTRODUCTION

This Farmers are unaware about the exact conditions of weather so the activity performed by them is not precise. They perform their activity as per their feeling and observation so every time it may not give the accurate result. So to give accurate result about what activity should performed in green

house by the farmers in different environment conditions this system is used. By using greenhouse automation we can increase the productivity. This system is based on monitoring and control the parameter which play important role in green house. When sensors reach a certain threshold it will send the signal to microprocessor, microprocessor will process that signal and perform appropriate actions

. For the proper and fast growth of different plants various parameters around them are important. The growth of the plant depends on parameter such as soil moisture, humidity, temperature etc. These parameters are controlled artificially in the green house to provide suitable environment for the growth of the plant. This system is design in such a way that which automatically controls the different parameters such as temperature, humidity etc. This technique is one of the smart agriculture techniques. If the temperature, pressure, PH of soil etc. changes then this system is help to maintain or set that value in proper manner.

This system reduces the manual overheads of monitoring different parameters and in process it reduces the percentage of the errors occurring due to the manual operations. Green houses are climate controlled. Green Houses have a variety of applications, the majority being, off season growing of vegetables, floriculture, planting material acclimatization, fruit crop growing for export market and plant breeding and varieties improvement. These structures range in size from small sheds to industrial-sized buildings. A miniature greenhouse is known as a cold frame. The interior of a greenhouse exposed to sunlight becomes significantly warmer than the external ambient temperature, protecting its contents in cold weather.

Many commercial glass greenhouses or hothouses are high tech production facilities for vegetables or flowers. The glass greenhouses are filled with equipment including screening installations, heating, cooling, lighting, and may be controlled by a computer to optimize conditions for plant growth. Three environmental parameters temperature, humidity and light are sensed by sensors and transmitted to the PLC (Programmable Logic Controller) where data are stored in data base and displayed on PC.

II. PLANNING

We all known “the best planning leads to the best results”. So when we finalized our project it was a question from where to start? There are many directions but we had to choose the right one. This was starting the step of our project. Now next task was procurement of material for that we listed first the required parts and divided our team in two parts. The work was equally divided. As our project is hardware and software based so one of us were worked for software and other one were worked for hardware.

We had divided our project in following parts:

- a) Designing of actual material.
- b) Procurement of material.
- c) Layout of PCB.
- d) Preparation of PCB.
- e) PLC
- f) Assembling of component and their maintaining.
- g) Software Implementation.
- h) Interfacing hardware with software.
- i) Testing and Result.

III. OVERALL DESIGN

For our automated greenhouse monitoring system, we are implement 2 types of sensor. The sensors to be used are temperature sensor , soil moisture sensor. We are building a miniature greenhouse and determine the appropriate positions to place a sensor. A series of tests will be done to make sure that all the sensors are working accordingly. These sensors are will be connected to a PLC which will function as main control unit.

The sensors will send signal to the PLC and the PLC will translate the signals and determine if the input is within the preset range. For instance, if the preset temperature range is from 20 degree Celsius to 25 degree Celsius, the PLC will make sure that the greenhouse temperature is within this range. If the temperature exceeds the maximum values, the bulb will turn on. As for the photodiode, if the greenhouse is exposed to insufficient light, it will send a signal to the PLC. The PLC will then process the signal and turn on the artificial light in the greenhouse. As for the humidity level is not within the required range, the water supply will be turned ON or OFF. The PLC will central processing unit which will translate the input signal from the sensor and turn ON or turn OFF the necessary device to maintain the greenhouse at present levels.

“To maintain environmental conditions inside the house for better production of crop within help of PLC which make it suitable for productive uses and help improve crop quality and quantity.”

IV. LITERATURE REVIEW

Various types of irrigation techniques differ in how the water obtained from the source is distributed within the field. In general, the goal is to supply the entire field uniformly with water, so that each plant has the amount of water it needs, neither too much nor too little

Surface irrigation

In surface irrigation systems water moves over and across the land by simple gravity flow in order to wet it and to infiltrate into the soil. Surface irrigation can be subdivided into furrow, border strip or basin irrigation. It is often called **flood irrigation** when the irrigation results in flooding or near flooding of the cultivated land. Historically, this has been the most common method of irrigating agricultural land.

Localized irrigation

Localized irrigation is a system where water is distributed under low pressure through a piped network, in a pre-determined pattern, and applied as a small discharge to each plant or adjacent to it. Drip irrigation, spray or micro-sprinkler irrigation and bubbler irrigation belong to this category of irrigation methods.

V. CONCLUSION

In today's life human being is becoming so busy that he can't pay his attention to work like water supply. But plants and trees are the sources of oxygen for human being and their existence is also important from earth's existence point of view and hence their growth is also important, but it is necessary that excess supply of water should be avoided to save the water. By providing precise timing for water supply this will help to save water.

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