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Low Cost Design for Automatic Control and Monitoring of Green House Using IOT

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Abstract:

To design a low-cost system that can gather data from greenhouse environment and control the system automatically with respect to the gathered data. By continuously observing the periodic conditions, this system works by securing connection between sensor readings, reference estimations& the cloud. Through long time benefits & lessening the human intervention, this system has been demonstrated that it has numerous points of interest. Monitoring of several parameters inside the greenhouse like light intensity, temperature, humidity, soil moisture using different sensors like LDR, DHT11 temperature and humidity sensor, grove moisture sensor, which will be interfaced with a microcontroller (Arduino) which further is connected to a cloud or a server. It is a closed loop system that will execute control action to adjust temperature, humidity, light intensity, soil moisture& can be controlled using a mobile application.

Keywords **—Greenhouse, Internet of things, IOT, control, electronics**

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I. INTRODUCTION

A Greenhouse is a place to grow plants under controllable environment for better crop yield, crop security, transplanting etc. As we all know due to rapid urbanization, the area for cultivation is continuously diminishing which results in increasing popularity for greenhouses. In most countries, the utilization of greenhouse has been developed for cost effective farming i.e. organic products,vegetables generation etc. The Greenhouses are very much helpful & beneficial because it provides an optimum condition for the crops to grow, protect them from adverse climatic conditions, extending the growing season, allowing you to sow plants earlier & harvest it later. The crop growth inside the greenhouse depends fundamentally on the availability of ideal atmosphere conditions which helps to attain high return at low cost, good quality and low natural burden. To attain these objectives a few parameters like light, temperature, humidity and soil moisture must be controlled ideally through proper warming, lighting, ventilation and water creation. Persistentmonitoring and controlling of these parameters give significant data relating to the individual impacts of the different elements towards acquiring better crop yield. These ecological factors are hard to control inside a greenhouse & the need for automated system arises. Temperature changes happen quickly and fluctuate broadly relying upon sun powered radiation levels, outside temperatures and moistness levels in the greenhouse. Poor light intensity and high moisture content frequently bring about poor yield. More exact control can decrease unwanted expenses like fuel and electricity,improve the efficiency of labourers by empowering them to go to more important assignments, empowering directors and producers to settle on better administration choices and invest more energy dealing with the procedure. Today, programmed control systems are the standard for advanced greenhouses, supported with changes as the innovation forces. Environment conditions can be monitored & controlled by these programmed control systems, where the system can be worked

consequently. The principle parts of any control framework are information preparing, information securing, information presentation, estimation controller and recording. In nature control framework, every parameter must be constantly monitored & controlled within a certain reach. But the problem is that, no such models yet exist for small scale greenhouse cultivation. In this research paper, we have proposed a low costsystem that can gather the data from greenhouse environment and control the greenhouse consequently with respect to the gathered data to foresee and follow up on circumstances for well controlled climatic conditions using Internet of things (IOT). By continuously observing climatic conditions, this project has the reason for making relationship between sensors values, reference values & the cloud server thus breaking down the development, advancement of yields and the natural variables to which they are uncovered. Also, by consistently observing various natural parameters without a moment's delay using mobile application, a userhas the ability to see how various conditions are fluctuating inside a greenhouse and control those fluctuations on a real time basis using a mobile application.

DESCRIPTION

This is alow-cost& highly efficient setup which is designed to respond to various climatic changes happening inside the greenhouse. It also helps in lessening the human intervention thus helps in overcoming the issues created because of human errors.

This system is designed in order to monitor & control the climatic parameters of a small-scalegreenhouse on a usual premise. The system contains sensors (LDR, DHT11&Grove sensor), Arduino which acts as a microcontroller, actuators, relay & cloud server. At any point when any of the above-mentioned parameters cross a predefined threshold value, which are an important factorfor securing better yields, the sensors sense the change and give this information to Arduino or the microcontroller. Arduino senses this information & transfer this information to the cloud or the server system. The information is processed &a notification is sent to the user. On receiving the notification, the user can control the parameters using the mobile application.

II. TEST RESULTS

1) **Control of light intensity**

The condition for optimum light situation is 0.7V-2.5V; when light intensity is 300 Lux. If the light intensity is below 300 Lux, then the system detects it &pass the information to the cloud or the server. The information is then processed by the cloud & it turn ON the Bulb using the relay module.

2) **Control of Temperature**

The ideal temperature of the greenhouse is set between 26 Celsius – 32 Celsius. If the temperature inside the greenhouse goes beyond the ideal temperature, then the system detects it& pass the information to the cloud or the server. The information is then processed by the cloud & it turn ON the actuator (Fan) using the relay module.

3) **Control of Humidity**

The ideal humidity inside the greenhouse is set between 40%-50%. If the humidity does not lie in between the above-mentioned range, then the system detects it &pass the information to the cloud or the server. The information is then processed by the cloud & it turn ON the actuator (Water Spray) using the relay module.

4) **Control of Soil Moisture**

The optimum soil moisture sensor reading inside the greenhouse is set between 1.9-3.5V. If the soil moisture sensor shows a value other than the above-mentioned range, then the system detects it pass the information to the cloud or the server. The information is then processed by the cloud & it turn ON the actuator (Water Pump) using the relay module.

III. CONCLUSIONS

Designed & developed a low-costsystem which can automatically control & monitor various parameters like Light intensity, temperature, soil moisture & humidity in a greenhouse using IOT. This system has effectively overcome the inadequacies of the existing frameworks by lessening the human intervention& thus increasing the overall efficiency.

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