Green House (Plant Automation)

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Abstract

The green houses are used to grow plants in a closed structure of environment. In our green we use even span type, we use even span because we planned to arrange the plants in a uniform manner. Generally plants have some basic requirements for a normal growth. To control and maintain these requirements we used different types of sensors and modules. By using this sensors and modules we can closely monitor the plant growth in our green house. In this Paper our main aim is to find whether a plant is diseased or not, it can be found with the help of temperature sensor and IR camera module. And it can be treated for the disease, where this entire process automatically in our green house..

Keywords:

1. Introduction

The green house is a structure with walls and roofs made of transparent material in which the plants require ambient climatic condition for growth. Based on the arrangement of plants the green houses are classified into different types, they are

- ❖ Even span green house.
- ❖ Uneven span green house
- ❖ Ridge and furrow green house.
- ❖ Saw tooth green house.
- ❖ Quonset green house.
- ❖ Lean-to greenhouse.

In our Paper we use even span type green house, where here the plants are uniformly arranged.

2.Plant Requirements

The plants in our surroundings generally require some basic requirements for its normal metabolism. In our greenhouse we maintain this with the help of electronics and adequate circuit assembly (sensors & modules). Were this helps to closely monitor the plant growth in our greenhouse.
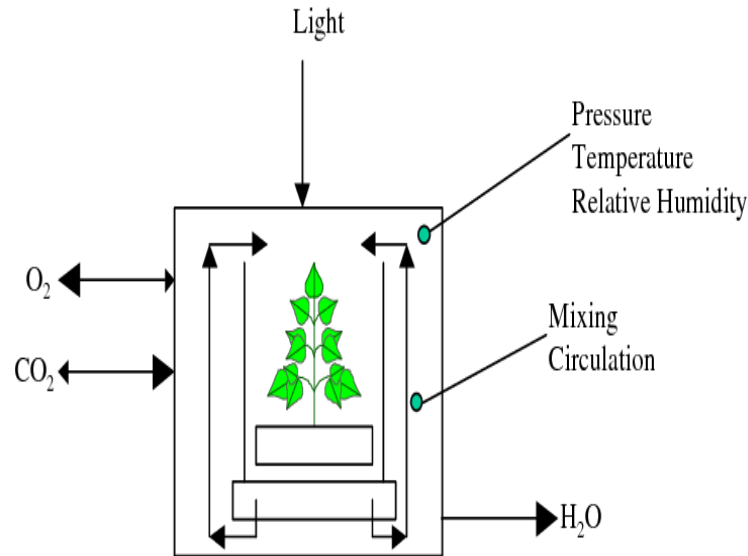
Fig.2 Plant Requirements

Sensors and modules used

❖ Temperature and humidity sensor.
❖ PH sensor.
❖ Soil moisture sensor.
❖ Passive infrared motion sensor (PIR).
❖ DS3231 RTC module.
❖ AMG8833 cam module.

3.Temperature And Humidity Sensor

The temperature and humidity monitoring process occurs through DHT11sensor in our project. This DHT11 sensor analyze the temperature and humidity present in the atmosphere of our green house. If there is any change in the moisture and temperature level, it can be altered and maintained by activating sprinkler and cooling fan. This can adjust with the help of DHT11 to obtain the required temperature and humidity in our green house. Hence the temperature and humidity value differs based on the plant used.
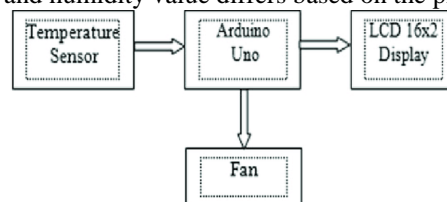

Fig3 Block Diagram of Temperature Senso

These DHT11 SENSOR analyze the temperature in the green house and gives the input to the ARDUINO UNO and it activates the fan where here temperature levels are displayed in the LCD display were this process occurs automatically without any manual process in our green house. By this it can set can set an ambient climatic condition for the plant growth to occur normally.
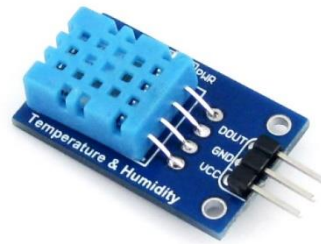
Fig 4.DHT11 SENSOR

3.1.Ph Sensor

The PH sensor in our project is used to monitor the PH value of the soil, with the help of PH sensor we can find the increasing and decreasing chemicals in the soil. These PH circuit consist of PH tube were it contains the buffer solution and it send the signal to the PH circuit board, were here it converts the chemical value into analogue value and gives the input to the arduino and we can closely monitor the PH value of the soil to maintain the plant growth in our project.

The PH value varies for different plant present and the different type of soil used in our green house. This variation can be adjusted by the help of input program given to the arduino to   monitor the plant growth.

Fig 5 PH SENSOR TUBE (buffer solution) WITH PH CIRCUIT BOARD

3.2.Soil Moisture Sensor

The soil moisture sensor helps us to monitor the soil moisture level to know that the humidity level is suitable for the plant growth in our green house. These soil moisture first find the soil humidity level and intimates the sprinkler to increase and decrease the humidity of the soil.

The soil moisture sensor consists of DS18B20 sensor connected to the arduino board were the suitable programming is done to set the suitable humidity level of the different types of plant used in our green house.

These soil moisture sensor plays a major role in maintaining soil moisture level, were it is the main reason for the healthy plant growth in our paper.
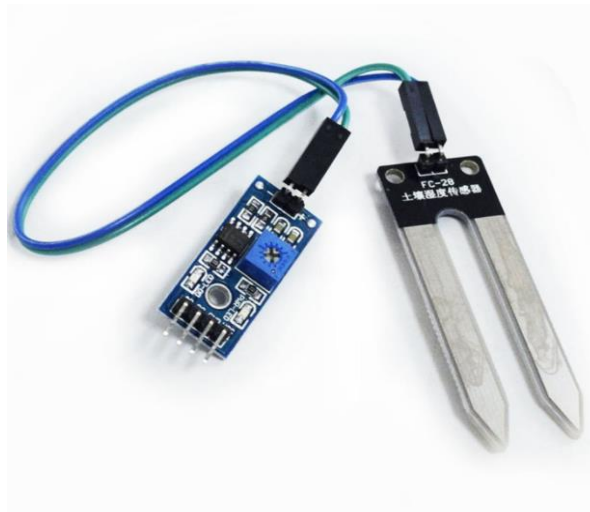
Fig 6 LM393IC

Fig 7 DS18B20 SENSOR

3.3.Passive Infrared Motion Sensor

The passive infrared motion sensor (PIR) is used to find the pests present in the plant or soil of our green house. Where in the presence of pests where the PIR intimates the sprinkler to sprinkle pesticides for the plant and soil in our green house project, this makes our plants free from pests.

Fig 8 Pir Sensor

3.4.Ds3231 Rtc Module

The DS3231 RTC module helps us to setup day and night effect in our green house. Where this DS3231 RTC module made connection with UV LED strip to act as an day and night setup for the plant growth, were the UV LED strip act as a sunlight source for the plants in our green house.

This DS3231 RTC module consists of real time clock with 12c integrated TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR (TCXO).

DS3231 RTC module is connected to the arduino and the UV LED strip connected with it and this makes the entire setup as day and night setup.
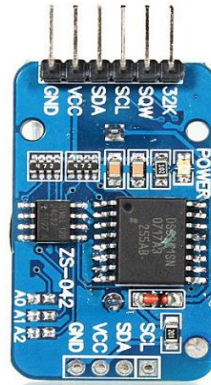
Fig 9 DS3231 RTC MODULE

3.5.Amg8833 Cam Module

The AMG8833 IR cam module is used to monitor the temperature of the plant present in our green house, were the AMG8833 is a thermal cam module used to detect the thermal temperature produced by the entire plant present. This temperature value helps to find out whether a plant is diseased or not in our green house, were this disease detection helps us to undergo further treatment for the healthy growth of the plant inside our green house.
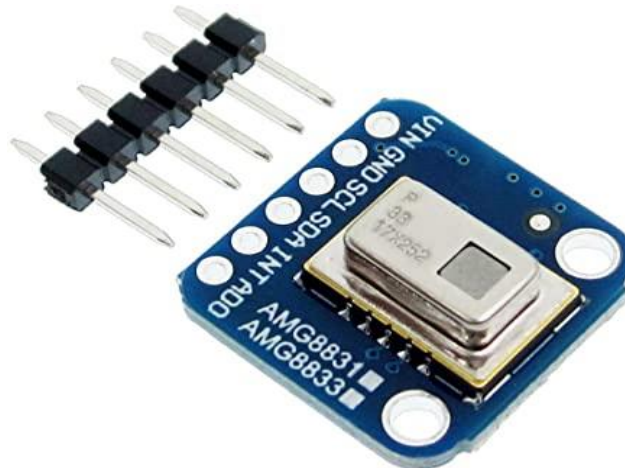
Fig 10 AMG8833 CAM MODULE

3.6.Air Ventilation

For the air ventilation process we are using a single fan on one end of the green house and the other end is left free with air filter to avoid dust particles coming inside our green house. The single fan is connected with the W1209 (THERMOSTAT) were it has a temperature control switch and it has a temperature sensor connected with it. This W1209 acts as an ON and OFF switch whenever there is change in temperature level and to maintain air ventilation in our green house.

First crtain temperature rate is set in the W1209 module, if there is any increase or decrease in the temperature level then in turns on the fan and keeps on running it till the required temperature is reached.

Hence this is the air ventilation process in our greenhouse for the healthy plant growth.
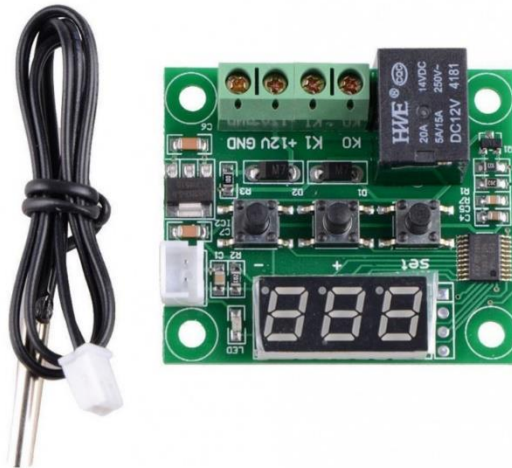
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Fig 11 W1209 (THERMOSTAT)

3.7. Our Ultimate Aim

- ❖ Our first aim is to find out whether a plant is diseased or not (diseases detection)
- ❖ The second aim is to make all the above process as automation (plant automation

3.8. Dsease Detection

The disease detection process occurs with the help of two sensors, one is the temperature sensor and the other is color sensor.

Then the disease detection can also be found with the help of AMG8833 IR cam module it finds diseased plants by thermal imaging.

3.9. Plant Automation

In this green house project were this plant automation plays an efficient role the green house monitoring. By this automation process we can control and monitor our greenhouse being far away from it. This automation can be made with the addition of wifi module & Bluetooth module for the further use connected to our greenhouse circuit.

Components

- ❖ *ARDUINO UNO.*
- ❖ *BREAD BOARD.*
- ❖ *SPRINKLER.*
- ❖ *UV LED STRIP.*
- ❖ *COONNECTING WIRES (JUMPER CABLE).*
- ❖ *RELAY MODULE.*
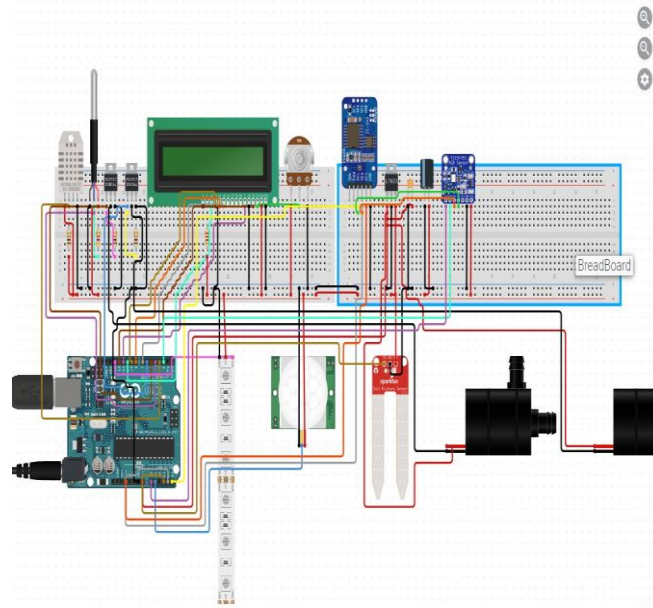- ❖ *POTENTIOMETER.*
- ❖ *WATER PUMP.*

4.Circuit Diagram:

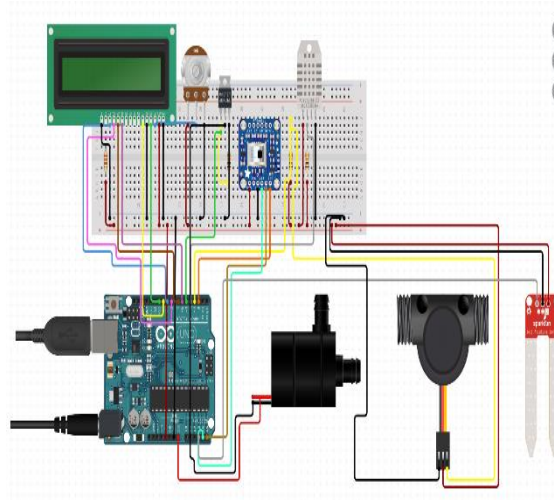**Fig 12a** Circuit Diagram of Green House

Fig 12b Circuit Diagram of Green House

5.Conclusions

Were the disease detection process is not   fully developed, the temperature, humidity, ph sensor are successfully installed. Then the temperature monitoring system varied for different plants and they were adjusted. This is the last update in our green house (plant automation).

6.Recommendation:

We are testing the different ways of finding the disease from leaves, stem and their temperature, where it can further improve our disease detection process.

Then we are optimizing the testing values of ph and temperature where it varies for different ranges.

7.Future Work:

The process of diseases detection is more difficult so we are planning to install ir thermal camera in our green house.

Then we are going to implement disease diagnosing factors for the further automatic treatment of diseased plants in our green house.

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Fig 13 Smart Green House.

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