IOT BASE SMART GREENHOUSE ENVIRONMENT MONITORING AND CONTROL SYSTEM

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ABSTRACT

The sole and the basic aim of our project is to be build an "IoT Based Smart Greenhouse Environment Monitoring and Controlling System". Our system is Arduino powdered and sensors play an important role to monitor and control various operations in our project, for which, we have used four sensors to detect the "Temperature Sensor" as Green house temperature should not go below a certain degree (set value in ºC). "Humidity Sensor" as high humidity can result to crop transpiration, condensation of water vapour on various greenhouse surfaces, and water evaporation from the humid soil. "Moisture Sensor" to know the amount moisture content of the soil in the greenhouse. "Light Sensor" so as to detect light and convert light energy to an electrical signal output to know the amount of UV rays entering into the system. If the soil moisture is found to be low, it turns ON the water pump to sprinkle water until the soil is moist, similarly, if the temperature in the green house is found to be high, a fan is turned ON, if the temperature is low, room heater is switched ON. If the light intensity is low, LED lamp is turned ON and if the humidity is low, then a humidifier is turned ON. In addition to this,the system also sends all four sensor values over internet for remote monitoring and control of LED lamp , room heater, humidifier, or a fan can be done manually, if needed through internet. Our system will be getting supply from solar panels which makes it sustainable.

1. INTRODUCTION: -

Greenhouse is a kid of place which can change plant growth and enviornment, create the best condition for Plant growth, and avoid influence on plant growth due to outside changing seasons and severe weather. Greenhouse monitoing and controlling project is used to measure the various parameteres like tempreture, Humadity, light,ad

soil, moisture. The system display these parameters on a LCD. Tempreture, and light is sensed by respective sensor, soil Moisture is sensed by metal rods or metal wire

2. BLOCK DIAGRAM:-

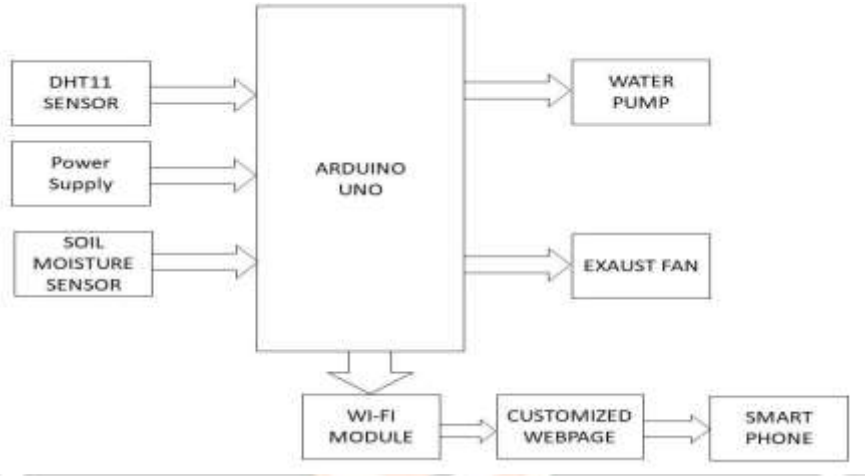


Fig -1: hardware model

Fig:-2 Project Mode

3.WORKING:-

Greenhouses, monitoring and controlling of many parameters are important for the good quality and productivity of plants. But to get the desired result some parameters like temperature, humidity, soil moisture, light intensity and soil pH are important for better plant growth. So an Arduino based greenhouse environment monitoring and controlling system using sensors has been designed. For this project, Arduino microcontroller is used.

Arduino can receive input from a variety of sensors and it can control motors, lights and other actuators. Four sensors, DHT11 sensor, LDR sensor, Soil moisture sensor and pH sensor are used. DHT11 sensor is used to measure temperature and humidity. Soil moisture sensor measures the water content in soil. PH sensor measures pH of the soil.

LDR sensor is used to measure light intensity. A cooling fan, exhaust fan, water pump, artificial light and motor pump are also connected to the Arduino. All environmental parameters are sent to android mobile phone via offline and online. A GSM modem and Ethernet are used to send environmental parameters to android mobile phone.

When temperature exceeds a defined level, the system sends SMS to the mobile user and the mobile user turns on the fan by sending another SMS. When the temperature comes to the normal range, the mobile user turns off the fan by sending another SMS.

When humidity exceeds a defined level, the system sends SMS to the mobile user and the mobile user turns on the exhaust fan by sending another SMS. When the humidity comes to the normal range, the mobile user turns off the exhaust fan by sending another SMS. When pH of the soil exceeds a defined level, the system sends SMS to the mobile user and the mobile user turns on the motor pump, which sprays acidic or alkaline solution by sending another SMS.

Similarly, when light intensity is lower than a defined level, the system sends SMS to the mobile user and the mobile user turns on the artificial lights by sending another SMS. Finally, when the soil moisture sensor does not sense moisture in soil then the system sends SMS to the mobile user and the mobile user turns on the water pump by sending another SMS. In order to eliminate SMS charges, all environmental parameters are sending to the server through Ethernet and stored in the database.

So, the user can monitor and control parameters through android mobile application. This device is very much helpful to the farmers to monitor and control environmental parameters at their farms. The farmers need not to go their farms.

Any change in the environmental parameter can lead to financial loses in agricultural and pharmaceutical industries and can be life threatening to the users of biomedical industries. By controlling immediately these losses can be prevented

4. COMPONENTS USED: -

(1) 16x2 LCD Display:

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.

(2) BJT:

A bipolar junction transistor is a three-terminal semiconductor device that consists of two p-n junctions which are able to amplify or magnify a signal. It is a current controlled device. The three terminals of the BJT are the base, the collector, and the emitter. A signal of a small amplitude applied to the base is available in the amplified form at the collector of the transistor. This is the amplification provided by the BJT

(3) CRYSTAL OSCILLATOR:

A crystal oscillator is an electronic oscillator circuit that uses a piezoelectric crystal as a frequency selective element.

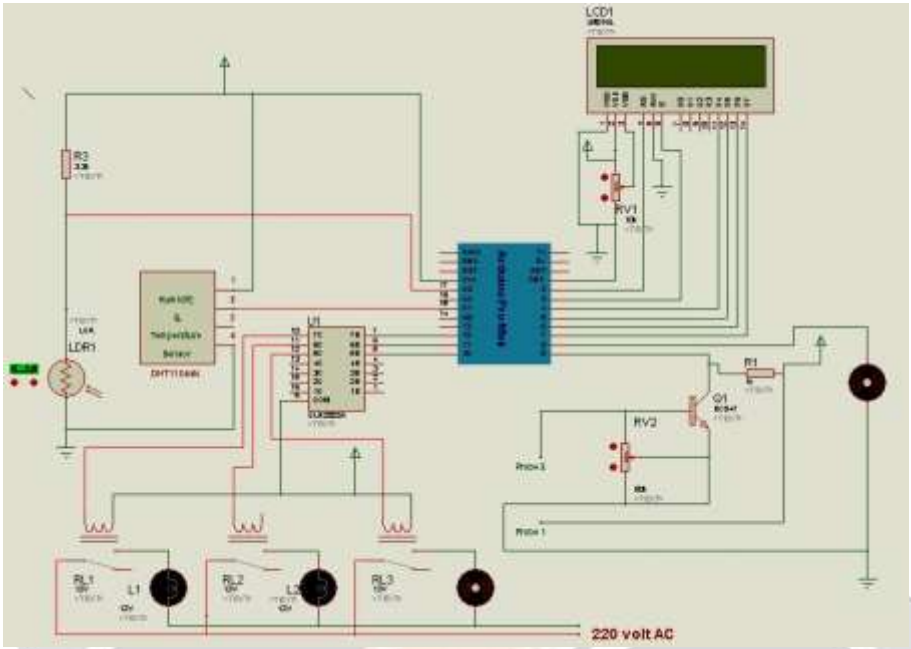
(4) RELAY:

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof. Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal.

5. LIST OF COMPONENTS:

Sr. No.	Part	Quantity
1.	16x2 Lcd Display With 12c Interface	1
2.	BC547 Bipolar Junction Transistor (BJT)	1
3.	WIFI Module	1
4.	Electrolytic Capacitor	3
5.	LM7805 5v Voltage Regulator IC	4
6.	LED	1
7.	Microcontroller At mega 328p	1
8.	5v Sugur Cube Relay	3
9.	Resistor	9
10.	DTH11 Sensor	1
11.	Moisture Sensor	1
12.	PCB	1
13.	Crystral Oscillator	1
14.	Water Pump	1
15.	DC Fan	1
16.	Adapter	1
17.	Diode	1

6. CIRCUIT DIAGRAM:-



7. ADVANTAGES:-

- This System help in Monitoring and controlling the climatic conditions that are favorable for the cultivation of a particular plant.
- By using this system, crops growth can be improved along with maximized yield, irrespective of the weather conditions
- Higher value and higher quality crops can be grown
- Efficient use of irrigation water

8. DISADVANTAGES:-

- Can be expensive to build.
- Requires constant monitoring, maintenance and care.
- Could increase electrical and water bills.
- May detract from aesthetic appeal of a garden.

9. FUTURE SCOPE:-

- The Smart Greenhouse can be further upgraded in many ways and can be used in wide agricultural applications.
- It can be placed and operated in any of the environmental conditions to grow any kind of vegetation.
- Non-conventional energy sources such as solar panels , wind mills are used to supply power to the automatic greenhouse equipment and Peltier effect for cooling purpose. Soil-less farming can be performed to further improve the nutritional value.

- Integration of farming with IoT can make it much more efficient and profitable activity. Smart Greenhouse has a bright scope of future in agriculture field and it will create a revolution in the way the agriculture is carried out in India

10. REFERENCES

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