

## GREEN HOUSE MONITORING AND CONTROLLING SYSTEM

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### ABSTRACT

As we know most of the gardeners use manual system to their plant in the garden and in the green house. This system is insufficient .When we manually do this, the possibility to get some plant can drown. In order to overcome this problem an automatic green house is used. The proposed system has measurement which is capable of detecting the levels of temperature, humidity, light, moisture content. This system has mechanism to alert farmers regarding the parameter changes in the green house so that early precaution steps can be taken.

**KEYWORDS:** Arduino, GSM, LCD, Greenhouse, Sensors.

### INTRODUCTION

#### BACKGROUND:

Now a days as population is increasing so the demand of fruits and vegetables is also increased. To fulfil those food requirements we have to yield more crops in less area with more quantity. If the food shortage is there in our country then we have to import the food from other areas. But it requires more cost. If we use artificial product for ripening of food then it decreases the good taste of food and also harmful to human being.

#### PURPOSE

For optimum plant growth and improved crop yields appropriate environmental conditions are necessary. Automating the data acquisition process of the soil conditions and various climatic parameters allows information to be collected at high frequency with less labour requirement.

## SCOPE

We use here small sized structure for demonstration. If we use large structure then it requires more components to control the environmental parameters. We have taken a crop of flower Gerbera which is used for decoration. Hence we can take its production at domestic level. If we set the values of environmental parameters for the Gerbera plant in program we can change those values for different plants.

## METHOD

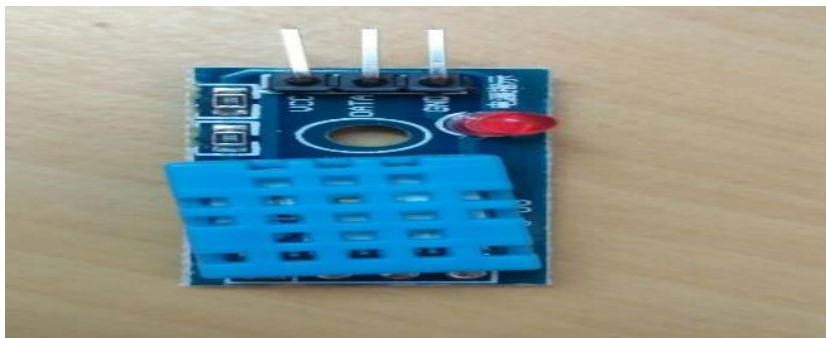
Greenhouse monitoring system designs a simple, easy for installation and arduino based circuit to monitor the values of temperature, humidity, soil moisture and sunlight of the natural environment that are continuously modified and controlled in order optimize them to achieve maximum plant growth and yield. As whole system operates by using arduino, there is no necessity to use ADC. Initially we preset the values of temperature, moisture, humidity, light intensity. When the value of temperature and humidity sensed by sensor are greater than set values, then the cooling fan and the heater for hot air also start respectively. When the sunlight is poor like in winter season then artificial light will be automatically on and when moisture content in soil is less than preset value then water pump will start.

The data acquired from the various sensors and the current status of the system display on LCD (Liquid Crystal Display). Also the use of easily available components reduces the manufacturing and maintenance costs. The design that we manufactured is quite flexible as the software can be changed any time.

## COMPONENTS

### DHT 11 sensor:-

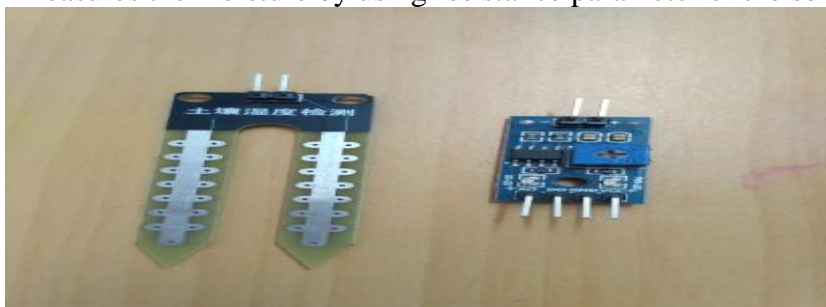
DHT 11 sensor is used to measure the temperature and humidity which has operating range is in between 3.5 v-5 v. This sensor measures the humidity and temperature in the greenhouse and control them. It has humidity measuring range is from 20% to 90%. It measures the specific temperature and humidity according to the environment.



Photograph 1- DHT11 Sensor

### Soil moisture sensor:-

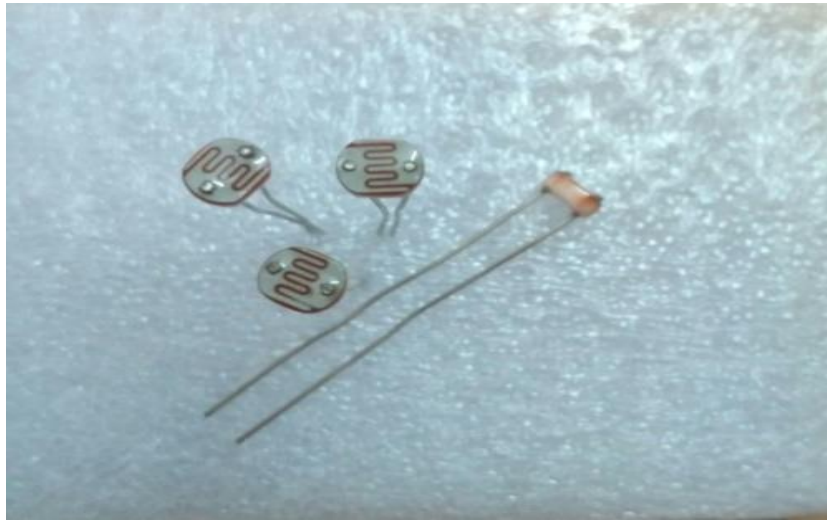
Moisture is the amount of water level present in the soil. When moisture content is less, then it is dry soil and when excess it is wet soil. Soil moisture sensor measure the volume of water content in the soil and converts it into the voltage. It has two copper leads which are immersed into the soil whose moisture is under test. This sensor measures the moisture by using resistance parameter of the soil.



Photograph 2 - Soil Moisture Sensor

**LDR:-**

If the light falling on LDR changes then its resistance changes. Since LDR is extremely sensitive in visible light range, it is well suited for the proposed application.



Photograph 3 - LDR

**LCD:-**

The data acquired from the various sensors and the current status of the system display on LCD (Liquid Crystal Display).

**Fan:-**

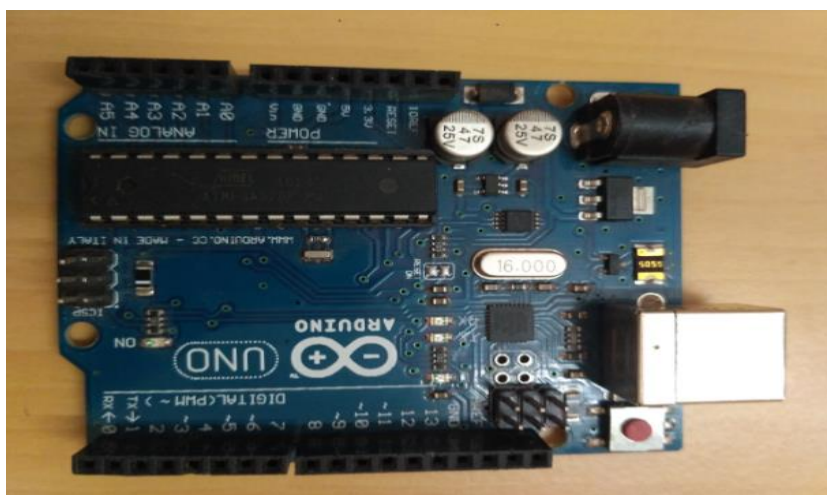
A mechanical fan is a machine used for cooling purpose.

**DC motor:-**

The motor used in this system is DC shunt water pumping motor. Its output is 35-36 watt

**Arduino:-**

Arduino is an electronic device. Arduino gets the values sensed by different sensors like soil moisture, LDR, DHT11 etc. Arduino Controls the environmental parameters by using the actuators like lights, motors, fan etc. Arduino language is C or C++. Arduino not uses the separate hardware to load program. You can simply use a USB cable. The code written for the arduino will get executed by the controller and it is directly connected to I/O pins. The controller is programmed via Tx, Rx pins connected to the USB to serial controller. It works on Mac, Windows and Linux.



Photograph 4 - Arduino

**GSM module:-**

GSM means Global System for Mobile communication. GSM is a telephony system that is used in Europe and other parts of world which is developed by ECSI (European Telecommunication Standard Institute). It is used for transmitting voice and data services operate at the frequency band of 850 Hz to 1850 Hz. GPRS (Global Packet Radio Service) transmission rate i.e. an extension of GSM that enables higher data transmission rate. GSM phone makes use of SIM card to identify the users account. This SIM (Subscriber Information Module) is smart card that contains users subscription information as well as some contact entries. This SIM card allows user to switch from one GSM phone to another. In GSM network more than one phone user can use at the same frequency channel. This can occur because the signal is divided into time slot. It works on TDMA (Time Division Multiple Access) based wireless network technology.



Photograph 5 -GSM

**WORKING:-**

If we get 12V dc supply from SMPS then it is given to Arduino, GSM etc. LCD gets 5V supply from Arduino. We set values of temperature, soil moisture, light intensity, humidity etc. in the Arduino. If sensors senses the values of the particular parameters then those values will displayed on LCD. If the sensed values are less or more than the set value then actuators will be work according to the set condition. Hence those parameters will be controlled according to set condition.

**BLOCK DIAGRAM**

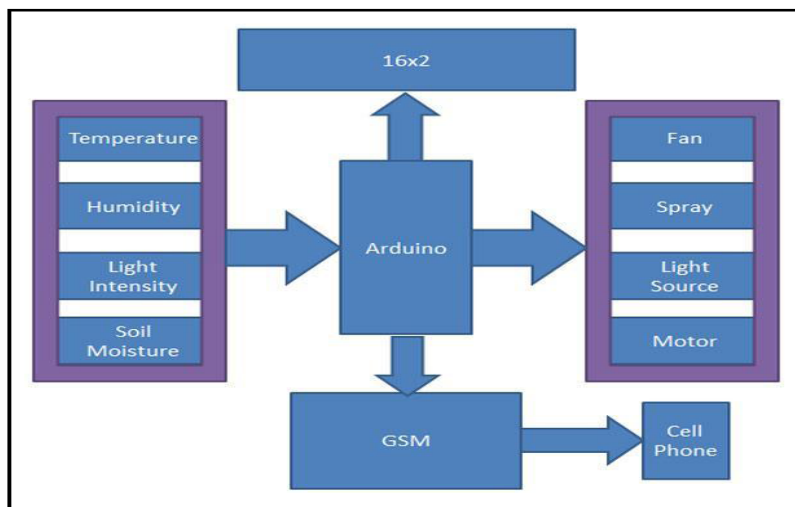


Figure -Block Diagram



**RESULT AND DISCUSSION:-**

The result obtained from experimental set-up of greenhouse monitoring and controlling system using GSM are as below;



Photograph 6 - Actual System

**CASE STUDY:**

In this study we took 300 gram soil. Then we studied voltage variation for different quantities of water content in the soil that is for 50 ml, 100 ml, 150 ml etc. And according to those readings we set the values of percentage moisture.



**1. Temperature sensor (DHT11):-**

The current status of temperature is given by DHT11 sensor at a different temperature conditions are mentioned in the table1.

Table 1: Temperature sensor outputs

Temperature Range(in degree Celsius )	Temperature Sensor Output(in volts)
30	1.04
35	1.78
40	2.32
45	2.51
49	4.34

**2. Humidity Sensor(DHT11):-**

At different environmental conditions the values of output obtained at the output of the humidity sensor is given in the table 2:

Table 2:-Humidity sensor outputs

Relative Humidity (in %)	Sensor Voltage Range( in volts)
45	2.043
50	2.24
55	2.41
61	2.72
71	3
79	3.2
92	3.5

### 3. LDR(Light Dependent Resistor):-

At different values of illumination status the values of output obtained at the output of the light sensor is given in table 3:

Table 3:-LDR sensor outputs

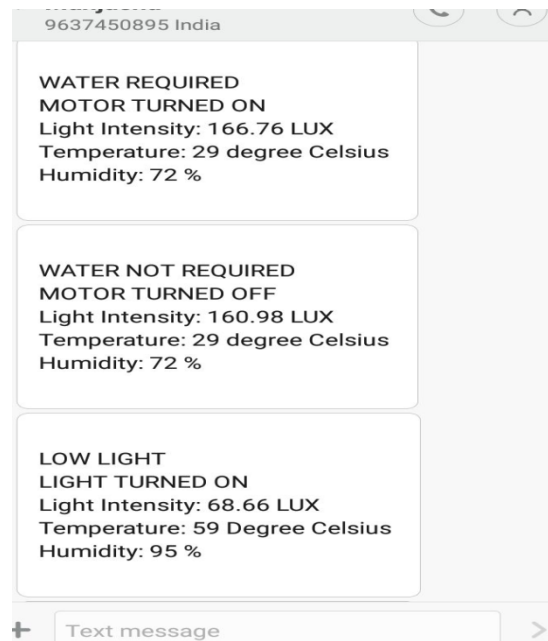
Illumination Status	Sensor Optimum Range (in volts)
Optimum Illumination	0.51 V
DIM Light	0.68 V
Dark	2.01 V

### 4. Soil Moisture Sensor:-

At different values of soil moisture content the values of output obtained at the output of the soil moisture sensor is given in table 4:

Table 4:-Soil moisture sensor outputs

Soil condition	Sensor Optimum Range(in volts)
Soil is dry	0.00 V
Optimum level of soil moisture	0.09 V
Slurry soil	0.14 V



### CONCLUSION

The automated greenhouse controls amount of light intensity falling on the light sensor by using bulbs. It also controls temperature when increases beyond set value by starting the cooling fan. And controls the

humidity content when goes below the set value by using bulbs as a heater. This system controls the amount of water content present in soil by actuating motor.

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