Data Acquisition and Supervisory Control System for Environmental Parameters in Greenhouse

Kratika Sharma [#1], Hemendra Shrimali [#2], Jaideep Sing Hada[#3],Abhishek Chattri[#5]

Abstract: In this project the process variables like Temperature, Humidity are sensed and their continuous reading is transferred to a remote PC via wireless. The project was initially computed and monitored on LabVIEW software and then its hardware circuit is prepared. The minimum response time between sensing and controlling is very small (few milliseconds). Minimum response time for ON and OFF the control relay was found in micro seconds. The parameter range can be controlled by the programmer controller.
A greenhouse environment parameters monitoring system based on wireless communication technology has been developed, which realizes the measurement, summary and control of temperature, humidity and the other parameters.

Keyword:- Microcontroller, relay, sensor, VRS, etc…

1. I.INTRODUCTION

In our project a greenhouse environment parameters monitoring system based on wireless communication technology has developed, which realizes the measurement and control of temperature, humidity and the other parameters at different places. DAQ (Data Acquisition) is defined as the process of taking a real-world signal as input, such as a voltage or current any electrical input, into the computer, for processing, analysis, storage or other data manipulation or conditioning.

LabVIEW (Laboratory Virtual Instrument Engineering Workbench) is a graphically-based programming language developed by National Instruments. Its graphical nature makes it ideal for Test and Measurement (T&M), automation, instrument control, data acquisition, and data analysis applications.

Earlier techniques are available to monitor and control the required environmental parameters for the particular crop. It is particularly crucial to analyze the methods which can effectively manage the proper environment. We use of wireless sensor network for the large area is now becoming popular in greenhouse technology of precision agriculture.

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II.WORKING

Our project is developed for industrial purpose as well as domestic purpose also which is sense the Temperature and Humidity at different places and control by AC (Air conditioner), heater and ventilator respectively. In this project the real data (Temp. & Humidity) are sense by sensor to environment. These digital data are transmit from sensor to microcontroller for calculating and controlling the parameter. After calculating data are controlled the field devices such as AC, Heater and Ventilator via relay. The LED are used for indication that the devices is ON or OFF. The project is required 12V power supply which are gating to step down transformer.

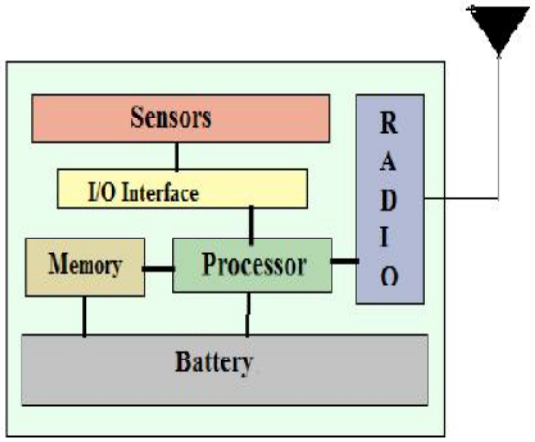


Fig.

FIG 1. Typical Sensor node

III. CIRCUIT DIAGRAM

Fig 2 shows the circuit diagram of the Data Acquisition System. The circuit diagram shows that the environment parameter such as Temperature and Humidity are controlled, manipulate and computed by the Data Acquisition System and transmit the data on PC via RF station. We take the output through relay.

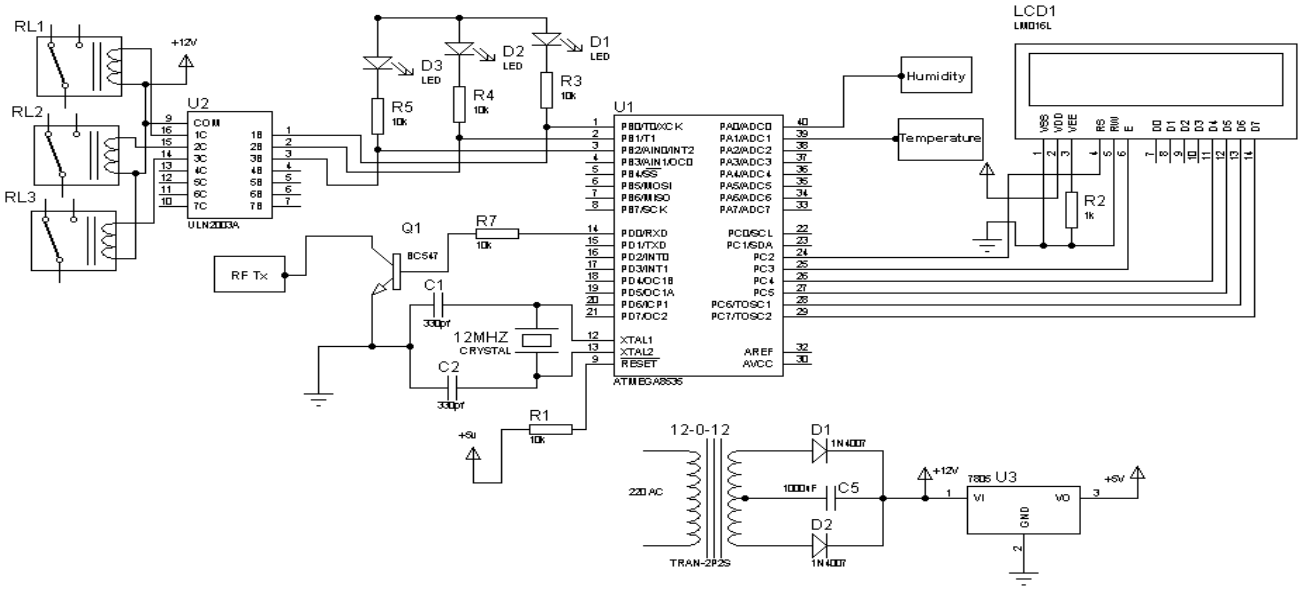
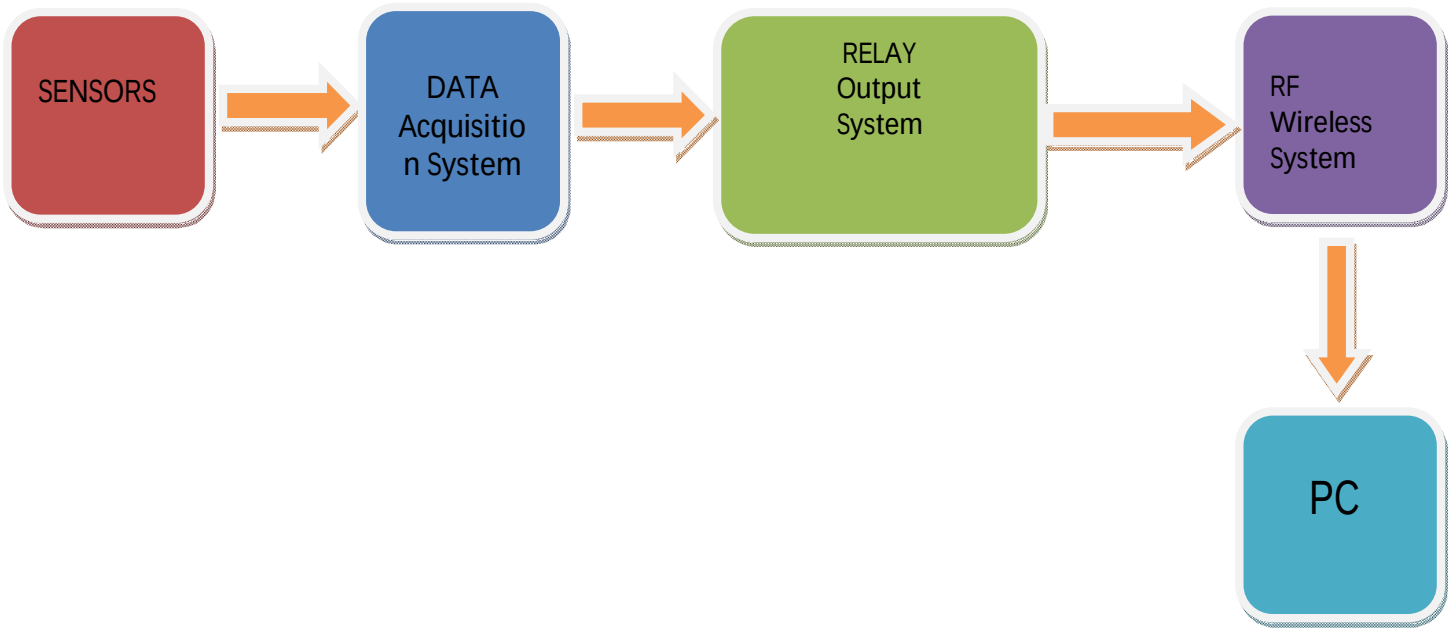


Fig 2 Circuit Diagram

IV.Block Diagram



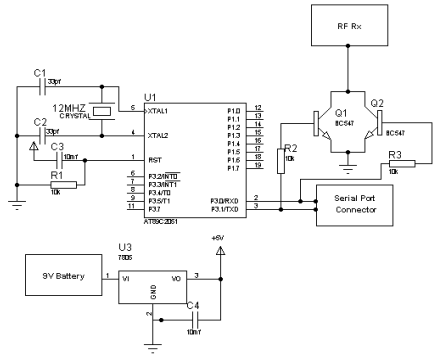


FIG :- 3 SHOWS THE CIRCUIT DIAGRAM OF THE RF SYSTEM

V. SYSTEMIC SOFTWARE

The systemic software includes data acquisition, data receiving and transmission by wireless and action program of every terminal, communication subprogram between PC and microcontroller, and data processing subprogram by PC. The program of microcontroller and PC are coded by Assembly language and LAB-view Software respectively.

Microcontroller program is present as follows:-

```
Dim Temp As Word
Dim Hum As Word
Dim Settmp As Byte
Dim Sethum As Byte
Dim I As Byte
Start Adc
Readeeprom Settmp , 1
Readeeprom Sethum , 2
If Settmp > 100 Or Sethum > 100 Then
Settmp = 30                          '28-30
Sethum = 60                          '50-60
End If
Main:
Do
Gosub Tmp
Gosub Humidity
I = Settmp - 2
If Temp > Settmp Then Portc.0 = 0
If Temp < I Then Portc.0 = 1
I = Sethum - 10
If Hum > Sethum Then Portc.1 = 0
If Hum < I Then Portc.1 = 1
Initlcd
Cls
Lcd "TEMP.=" ; Temp ; " S.T.=" ; Settmp
Lowerline
Lcd "HUM.=" ; Hum ; " S.H.=" ; Sethum
If Pinb.0 = 0 Then
If Settmp <= 100 Then Settmp = Settmp + 1
Cls
Lcd "SET  T.=" ; Settmp
Waitms 200
Writeeeprom Settmp , 1
End If
If Pinb.1 = 0 Then
If Settmp > 0 Then Settmp = Settmp - 1
Cls
Lcd "SET T.=" ; Settmp
Waitms 200
Writeeeprom Settmp , 1
End If
If Pinb.2 = 0 Then
If Sethum <= 100 Then Sethum = Sethum + 1
Cls
Lcd "SET HUM=" ; Sethum
Waitms 200
Writeeeprom Sethum , 2
End If
If Pinb.3 = 0 Then
If Sethum > 0 Then Sethum = Sethum - 1
Cls
Lcd "SET HUM=" ; Sethum
Waitms 200
Writeeeprom Sethum , 2
End If
Waitms 200
Loop
End
Tmp:
Temp = Getadc(0)
Temp = 50 * Temp
Temp = Temp / 102
Waitms 100
Return
Humidity:
Hum = Getadc(1)
Hum = 5 * Hum
Hum = Hum / 33
Waitms 100
Return
```

Sensors are mounted on Data Acquisition System. The DAQ System has some electronic component such as resistor, transistor, wire bus, connectors, LEDs for indication, LCD for display, microcontroller, and relay for output. These all components are perfectly designed for manipulate, computed and controlled the Real parameter through environment, its designed are called DAQ System.

In the DAQ system the Relay are use for output system which is controlled the AC, Heater and Ventilator ordered by microcontroller and according to real environment parameter such as Temperature, Humidity respectively.

These Data are transmit on PC through RF signal (wireless system). The received Data are computed

and controlled on LabVIEW software, these LabVIEW software is installed in PC.

VI. ACTUAL DIAGRAM

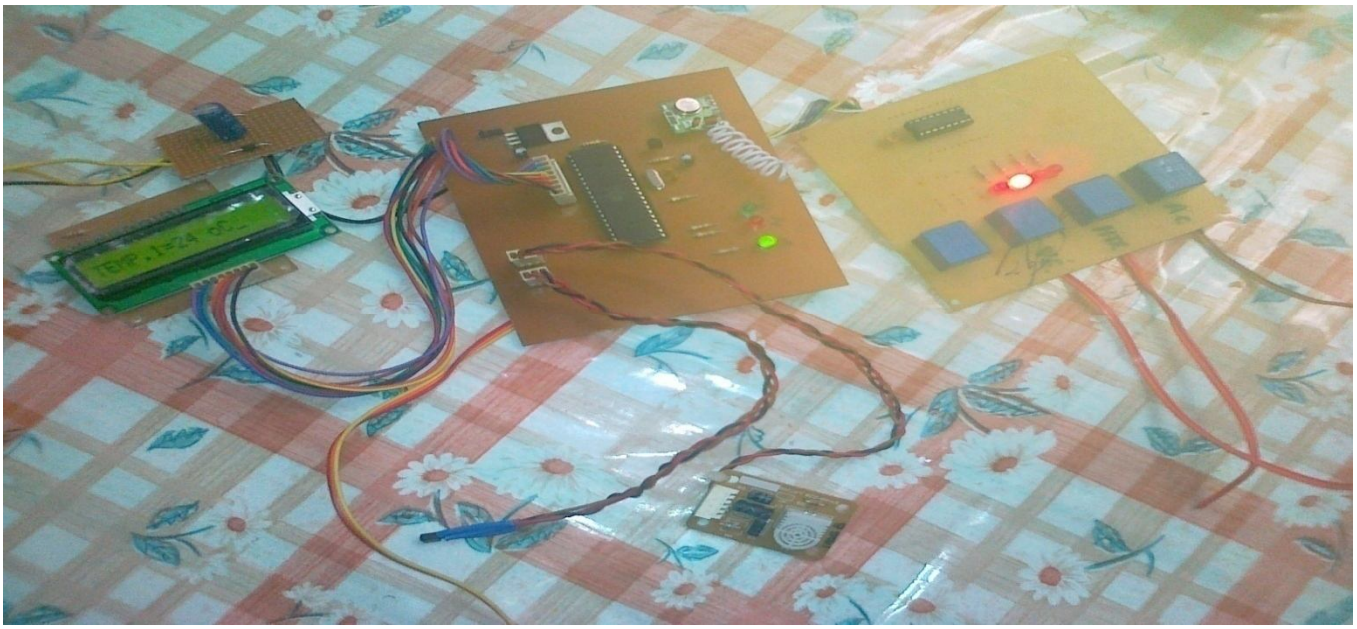


Fig 4 PCB circuit design

Fig 5 RF section

Time (milliseconds)	10	100	1000	10	100	1000	10	100	1000
Humidity (%)	48 %	52 %	58%	62%	70%	75%	80%	85%	79%

Humidity :- 80% Ventilator ON

Time (milliseconds)	10	100	1000	10	100	1000	10	100	1000
Temp.1	18°c	20°c	25°c	35°c	42°c	48°c	51°c	56°c	48°c
Temp.2	27°c	32°c	35°c	45°c	50°c	49°c	43°c	38°c	25°c

Temp.1:- 20°c Heater ON, 50°c Air Conditioner ON
Temp.2:- 25°c Heater ON, 45°c Air Conditioner ON

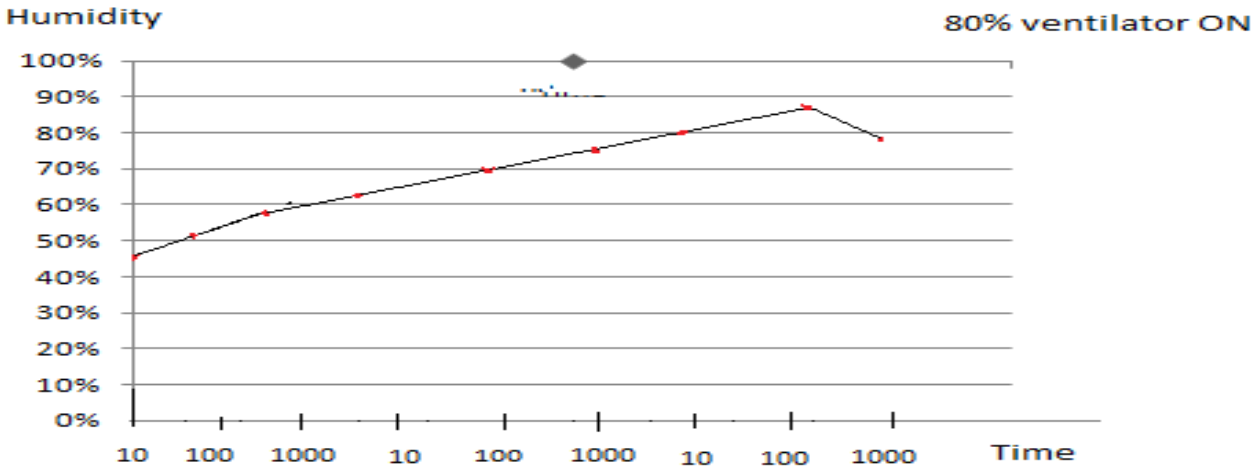


FIG 6 .Humidity vs Time Graph

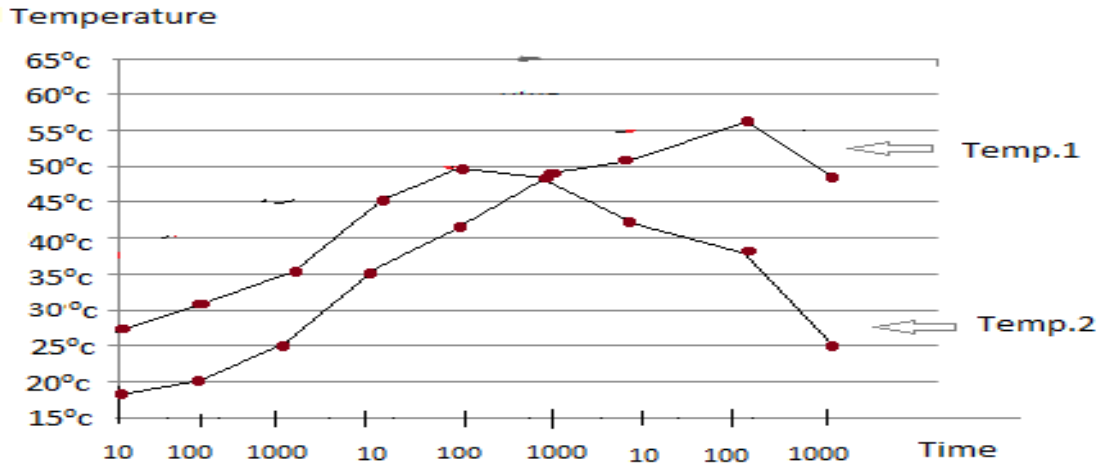


FIG7.Temp. vs Time

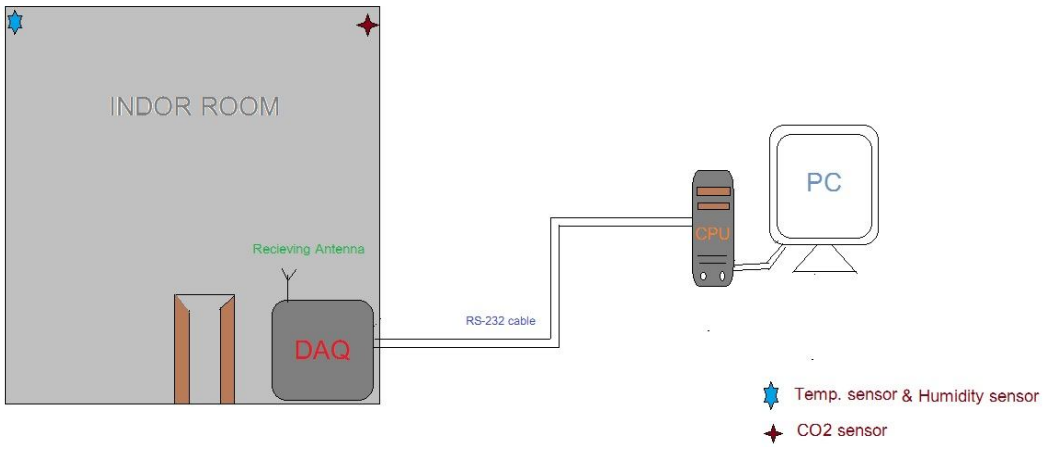


FIG8. overview of the model

VII. CONLUSION

The measurement and control system for environment parameters in greenhouse based on wireless communication technology is developed and initially experimented. The experimental results indicate that the system has some features as follows:

(1) It is applied to agriculture vegetable greenhouse can commendably overcome the disadvantage of traditional measuring and controlling system in greenhouses.

(2) It can be kept long distance, real time monitoring for parameter of greenhouse and the information can be obtained of greenhouse at any time.

(3) It has the advantages of not needing cables, low power consumption, cheap cost, good robustness, flexible extension, convenient installing over the traditional measurement and control system. And I also concluded that the LABVIEW software is more sophisticated, reliable and give accurate result. LABVIEW software is supportable for engineering student for designing and also supportable for supervisory of the plant.

VIII.REFERENCES

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