



# Wireless Sensor Network Based Greenhouse Monitoring System

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## ABSTRACT:

*To determine the growth of greenhouse crops ,it is important to check some essential parameters like c02,humidity,light,temperature,moisture etc.To check this parameter manually is difficult therefore wireless sensor network base on AVR microcontroller is developed.Greenhouse are usually frame structure covered with transparent matrial in which crops can be grown under the controlled environment.To achieve good result at the end of agriculture production some parameter like c02,temperature,light,moisture,humidity should be monitored.To monitor these parameters we use several sensor node with three commercial sensor to measure the above parameters.Wireless sensor network have played major role in recent year.These network are used for collecting,storing and sharing sensed data.There are different application of wireless sensor network such as habitat monitoring,agriculture,nuclear control,security,tactical survelliance and so on.Which can not monitor by human.*

**KEYWORDS:-**Zigbee wireless network; enviornmental parameters.

## INTRODUCTION:

With the increasing demand for crop production and quality,utilization of quality and productivity of greenhouse is increased.Greenhouse creates the best conditions for plant growth and avoid influence on plant due to severe change in weather.For precision agriculture the modern large scale greenhouse has been widely used.Greenhouse adopt different species of plant in different season.Before some years the greenhouse required a very large manpower to install,in which cable are used.The solution of this problem is wireless sensor network.It is collection of sensor by wireless medium.The greenhouse wheather parameter information is collected by the sensors and it sends to a computer system called as a base station.As

compared to the cable greenhouse system the WSN based greenhouse system is fast,cheap and easy.The greenhouse system base on WSN play vital role in social and economical benefits of agriculture production.

## HARDWARE REQUIRED IN THE SYSTEM:-

The whole system is divided into three types.The first part is sensor node for data aquisition and PCB design.After aquisition sensor node transmit the sensor reading wirelessly through the antenna.The second part is sink node,which is in the base station to receive the data.The third part is computer the display the data.

### A] Sensor Node:-

Sensor node consists of a sensor module, a processor module, a wireless communication



module and a power supply. Sensor module use temperature, humidity light moisture and co2 sensors. Processor module and wireless communication modules use the CC2500 chip. A 9V 2100mA battery is used for power supply.

**Table1:CC2500 Specifications:-**

Operating temperature	-40 to 85degree C
Operating supply voltage	2.0 to 3.6V
Frequency range	2400 to 2483.5MHz
Data rate	1.2 to 500kBauds

### Sensors:-

#### 1]Humidity Sensor:-

It is used for monitoring the humidity inside the greenhouse.It has following specifications.

**Table2 : Humidity sensor specifications:-**

Rated voltage	DC 5.0V
Rated power	<=3.0mA
Operating temperature range	0 to 60degree C
Operating humidity range	30 to 90% RH
Storage humidity range	Within 95% RH
Storage temperature range	-30 to 85degree C
Standard output range	DC 1.980Mv
Accuracy	=5% RH

#### 2]Temperature sensor:-

LM35 is used as temperature sensor.LM35 is a precision IC temperature sensor,whose output voltage is linearly propotional to celcius temperature.It hasa very low self heating as it draws very less current from power supply,and low output impidence it has the following specifications.

**Table3: Temperature sensor specifications:-**

Accuracy	0.5 degree C
Range	-55 deg to 150deg C
Operating voltage	4 to 30V
Current drain	<60uA

Self heating	0.08 deg C
Output impidence	0.1 ohm for 1mA load
Output current	10mA
Output voltage	-1V to 6V

#### 3]Light sensor:-

Light Dependent Resistor (LDR) is used as light sensor. LDR is a resistor whose resistance decreases with increasing incident light intensity. It is made of a high resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band.

#### 4]CO2 sensor:-

MQ6 gas sensor has high sensitivity to propane ,butane and LPG,also response to natural gas.The sensor could be used to detect different combustibile gas,specially methane,it is with low cost and suitable for different application.It has various characteristics such as good sensitivity to combustibile gas,high sensitivity to propane,bitane and LPG,long life and low cost, simple drive circuit

#### B] Sink node

Sink node shown in Fig. 5 consists of CC2510 chip which act as processor and wireless communication module. A 9V 2100mA battery provides power supply. LM1117 is used as voltage regulator. MAX232 [20] is used to provide  $\pm 12V$  for RS232 communication using four 1.0 $\mu F$  external capacitors.

#### SOFTWARE REQUIRED:-

Different sensors required are Atmel studio 6.0 which is used for the compiling purpose.Embedded C language is used for the programming,flash magic software is used for monitoring the parameters.PCB artist software for PCB designing and sinaprog for the burning purpose.

#### FUTURE EXPANSION:-

Papers presented in ICRRTET Conference can be accessed from

<http://edupediapublications.org/journals/index.php/IJR/issue/archive>



In this project data wirelessly monitor using cc2500 module but problem it is that Range limitation. This problem can be solve using High range wireless module or using web base we can monitor and control data.Using processor this system can be advance and much more sensor interface with them.

### CONCLUSION:-

According to the characteristics of modern greenhouse production,the paper introduce wireless sensor network technique to greenhouse wireless detection-control system, and the whole greenhouse system can automatic adjust by combining wireless sensor network technology with greenhouse control technology. In hardware, WSN nodes mainly compose of Atmega16 and Wireless transceiver chip CC2500.

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