A Smart Green House Automation System by Wireless Sensor Networks

Prof. A. V. Zade[1], Simran Harwani[2], Pallavi Bawankule[3]
Computer Science & Engineering[1,2,3], DES's College of Engineering and Technology [1,2,3]
Email:amolzade11@gmail.com[1], simranharwani21@gmail.com[2], pallavibawankule001@gmail.com[3]

Abstract- Wireless Sensor system is one of the most capable technologies in the 21st century. Smart Green House Automation is a system in which DHE11 sensor is used, which monitors parameters like Temperature and Humidity in the greenhouse. After monitoring, controlling of these parameters also take place. In this system, both manual and automatic method are used for controlling the parameter like Temperature and Humidity. This software uses an Android mobile phone for monitoring as well as controlling greenhouse, connected to a central server which is connected to a microcontroller via serial communication. Microcontroller communicate switch the variety of sensor modules. The purpose of this project is to design an easy, easy to mount, user-friendly to monitor and trace the values of temperature, humidity, and sunlight of the natural atmosphere that are constantly modified and controlled in order optimize them to achieve maximum plant increase and yield.

Keywords: Arduino UNO, DHT 11 sensor, embedded system, Greenhouse, wireless network.

1. INTRODUCTION

Modern technology application In a greenhouse environment, can improve the production efficiency and security, reduce production cost, promote the improvement of agricultural automation degree, still can reduce the production strength, improve employee management level, thus bring huge economic benefits and social benefits. A greenhouse is an arrangement with different types of covering material, like wineglass or artificial and normally glass or plastic walls; it heat up because inward visible solar radiation from the sun is immersed by plants, soil. Glass is visible to this radiation. The hot structures and plants within greenhouse re-radiate this energy in the infra-red, to which glass is partly obscure, and there is a few amount of heat loss due to transmission and raise in high temperature inside the greenhouse. The greenhouses are filled with environment parameters like temperature, humidity, moisture and light. Farmers don't know the exact condition of the weather so whatever activity performed by them is not accurate. They perform such activities either by observation or as per their feeling, so every time it may not possible that they would get the proper results. So to give the accurate result about what activity should be performed in a greenhouse by the farmers in different environment conditions this system is used. By means of the greenhouse, we can raise the efficiency. In our arrangement, we can monitor the conditions of the environment as well as manage the conditions from a remote place. So it exceptionally uses full system. It is based to perform following activities that are to monitor the system and control the system from a remote place that controls the weather inside the greenhouse by performing actions like fogger on/off or heater on/off etc. It contains basically Arduino UNO microcontroller, computer server and Android Smartphone in the system. This system works in two modes manual mode and automatic mode. Automatic mode is based on the threshold range. When sensors reach a certain threshold it will send the signal to the microprocessor or a microprocessor will process that signal and perform appropriate actions.

2. SYSTEM OVERVIEW

The proposed system consists of microcontroller Arduino, DHT11 sensor, and IEEE wireless 802.11g. The microcontroller Arduino is used for monitoring and controlling the greenhouse parameters such as temperature and humidity. The DHT11 sensor measures both the parameters humidity and temperature. The microcontroller is used to read the temperature and humidity value from the sensor. DHT 11 sensor gives the result in digital form so there is no need of analog to digital conversion.

International Journal of Research in Advent Technology, Vol.5, Issue 3, March 2017
E-ISSN: 2321-9637
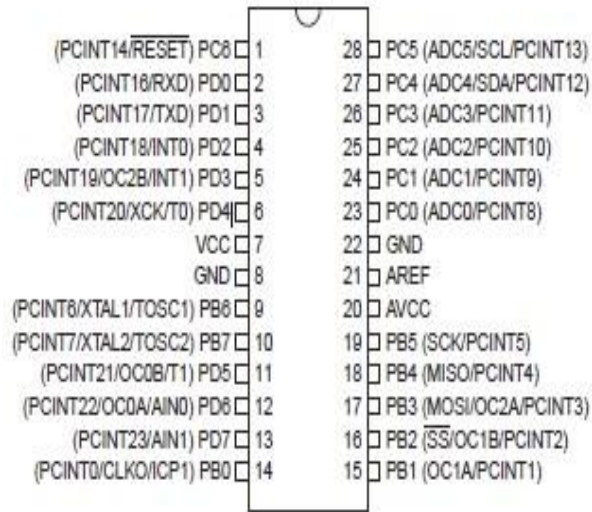*Available online at www.ijrat.org*

Fig.1. Architecture of AT MEGA 328
Microcontroller Arduino.

After getting the digital signal from the sensor, the microcontroller sends the value from sensor to the android via computer through serial communication and wireless connection.

2.1 DHT11 Sensor

The DHT11 sensor move toward in only row 4-pin place together and control from 3.5V to 5.5V power supply. It can measure temperature since 0-50 °C with an accurateness of ±2°C and relative humidity range from 20-95% with an accurateness of ±5%. The sensor provide fully calibrate digital outputs for the two measurements. It has got its own proprietary 1-wire protocol, and for that reason, the contact stuck between the sensor and a microcontroller is not possible for the period of a direct interface with several of its peripherals. The protocol has to be implemented in the firmware of the MCU with exact timing required by the sensor.
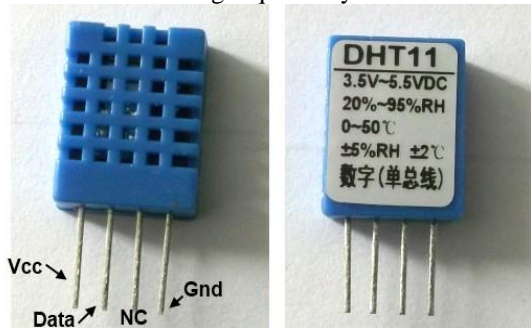

Fig. 2. DHT11 Sensor

3. DESIGN OF SMART GREEN HOUSE AUTOMATION SYSTEM

This designed system for monitoring and controlling the greenhouse is based on measuring the humidity and temperature by a sensor that located at different places. The monitoring and controlling of greenhouse parameters are conducted through Android Smartphone. Smart Green House Automation System consists of the DHT11 sensor for the humidity, microcontroller, wireless connection, serial communication, a personal computer as a server, power supply unit and model of the greenhouse. The input to the microcontroller is the values from the sensor. The values are then sent to the computer by the microcontroller through serial communication. In this system, the working of the computer is to transfer the data to android mobile through wireless communication. Android smartphone control the microcontroller and the components such as fogger and heater. In this system three kinds of activities are performed, the level of humidity inside the greenhouse is monitored with the help of a DHT11 sensor. If the greenhouse is too dry fogger is activated to maintain the humidity level. Deactivation of fogger can also take place. If the greenhouse is too humid, the heater in the greenhouse Is turned on to maintain the level of humidity.
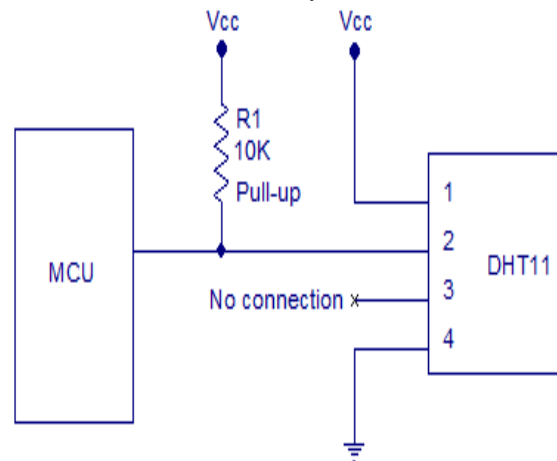

Fig.3. Schematic Diagram Showing the DHT1 Sensor connected to microcontroller.

All of these activities are takes place with the help of software. The working of software is to send the humidity value from sensor to microcontroller. Then continue to display the value in the application at android. A microcontroller is controlled by the software and updates the user by sending the value of

the sensor for monitoring the greenhouse. The program is written in Arduino 1.0.1 IDE. The server used to process the value from the sensor, serial, and wireless communication by PHP serial programming to transfer and receive the input for controlling and output for monitoring.

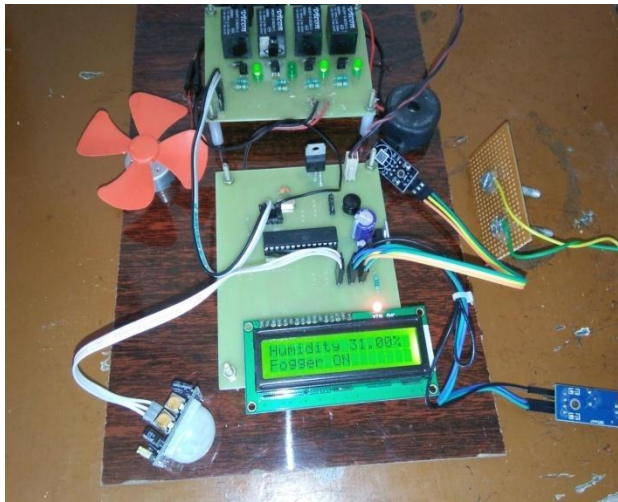## 4. IMPLEMENTATION OF SMART GREEN HOUSE AUTOMATION SYSTEM

Fig.4. Actual Hardware Implementation

5. CONCLUSION

In this paper, a design methodology for monitoring and controlling humidity and temperature inside the greenhouse is designed. The Android-based greenhouse monitoring and controlling system communicate with the micro web-server via the internet fully based web service. Any android supported device can be used to install the greenhouse, and control and monitor the environment inside the greenhouse. This system is capable of controlling the essential parameters necessary for plant growth, viz. Temperature and humidity. In this system, the user can control their greenhouse from the remote location by using android mobile. A low-cost greenhouse monitoring and the controlling system has been developed which does not require a PC as all processing is handled by the microcontroller.

REFERENCES

[1] Yuquan, M., Shufen, H., Qingzhu, W., "New Environment Parameters Monitoring and Control System for Greenhouse Based on Master-Slave Distributed", IEEE Conference Publications: 978-1-4244-6947-5/10, 2010, Page(s): 31-35.

[2] Qingzhu, W., Shuying, M., "Development of Multi-span Greenhouse Measure and Control System", IEEE Paper: 978-1-4244-7941-2/10, 2010.

[3] Ai, Q., Chen, C., "Green House Environment Monitor Technology Implementation Based on Android Mobile Platform", IEEE Paper: 978-1-4577-0536-6/11, 2011, Page(s):5584 -5587.

[4] Mittal M., Tripathi, G.,"Green House Monitor and Control Using Wireless System Network", VSRD International Journal of Electrical, Electronics & Communication Engineering, Vol. 2(6), 2012, Page(s): 337-345.

[5] TeemuAhonen, ReinoVirrankoski and Mohammed Elmusrati.,Greenhouse Monitoring with Sensor Network, Department of Computer Science Telecommunication Engineering Group, Vassa, Finland.