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RESEARCH ARTICLE

Android based Greenhouse Monitoring and Controlling System

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Abstract— In agricultural country like India, greenhouses form an important aspect of agricultural and horticulture sectors. In greenhouses, plants are grown under favourable climatic conditions for its production and growth. Thus monitoring and control of greenhouse environment is necessary for production and management of greenhouses. This project is designed to monitor and control the indoor humidity and weather conditions affecting the plants using embedded system and Android mobile phone. The android phone is connected to a central server which then connects to microcontroller and humidity sensor via serial communication. Thus the sensor records and manages the required weather conditions proved to be appropriate for plant growth.

Keywords— horticulture, monitoring, favourable, indoor, microcontroller

I. INTRODUCTION

There is continuous increase in demand for food production technology. India is a country where the economy is dependent on agricultural produce. Agricultural means can satisfy the food production demand. But due to isotropic climatic conditions, lack of water reservoir, agricultural produce does not meet the demands.

At the present scenario, farmers have been using different irrigation technique for increasing production. These techniques were done by human intervention. But due to this sometimes either the plants consume more water or the water reaches late up to the plants. This ultimately affects the plant growth. Also there are many such problems associated with it. To overcome from this problem, we can use an automatic micro controller based system. For automatic monitor and control we are developing an embedded system which will record the temperature, moisture and other parameters that will control the environmental conditions in the plant field. Moreover for effective control, an android application is used along with embedded system.

II. LITERATURE REVIEW

Since 1990's, for greenhouse and environment monitoring various kinds of systems have been developed. But due to lack of awareness, cost and implementation factors, these systems were left behind. Later a DSP based prototype Greenhouse Environment Monitoring system developed in 2010. Then in 2012, a Digitally Greenhouse Monitoring and Controlling System based on Embedded was developed. This system used a low power, cost efficient chip, microcontroller based circuit to monitor and record the values of humidity, moisture to achieve maximum plant growth [5]. Bharat Institute of technology issued a report on 'The Project GreenBee' based on Monitor and Control of greenhouse environment. According to the report, the system is modelled for

the automation of greenhouse using embedded system [6]. Further a Zigbee based Greenhouse Monitoring and Controlling system was developed in 2013[9]. But the problem exist with Zigbee, it is not easily available.

In this project Android application is used for the maintenance and control of greenhouse, which is easy available in most of the smartphones and easily upgradable. Due to automated wireless connection technology, it reduces manpower and provides better accuracy [10].

III. SYSTEM DESIGN

Basically the system is embedded system designed for greenhouse monitor and control based on measuring humidity and temperature sensors which are located at different places. Here the monitoring and controlling is done with the help of Android smartphone.

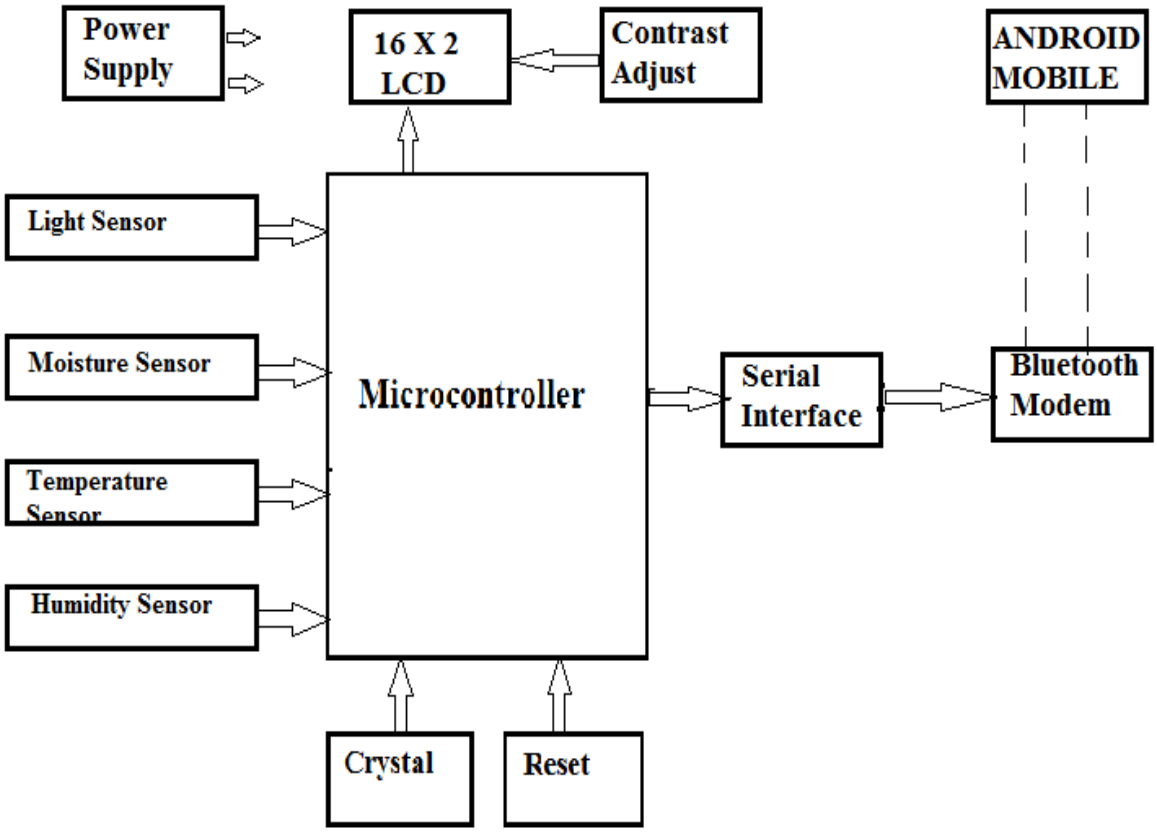

Figure 1: Block diagram of Android based Greenhouse Maintenance and Controlled System

The system consists of temperature, light, moisture and humidity sensors which are interface to the microcontroller. The microcontroller periodically reads the sensor value and updates to the android via Bluetooth.

Hardware components:

1. Four sensors - LM35 (a temperature sensor), LDR (a light sensor), Humidity and Moisture sensor.
2. AVR microcontroller.
3. LCD for display.
4. Power supply.
5. Bluetooth.
6. Android phone.

Software tool:

The software is designed to maintain and control the environment of the greenhouse. Keil software is used for the programming of the microcontroller.

IV. SYSTEM OVERVIEW

The system is a greenhouse system in which there are four sensors. These sensors act as input to the microcontroller system. The input feed provided to the microcontroller is in the form of analog data. This data is converted by the controller into digital format. The data is shown on the LCD display and also on the android phone via Bluetooth. Thus the monitoring of temperature, moisture and other parameters is done automatically. Once the parameter values are monitored they can be control by the embedded system which is built with coding. This is automating controlling system. The android phone is operated by the user. The android application is used for controlling as per the user knowledge and required output.

V. IMPLEMENTATION

A. *Hardware Implementation:*

In the hardware implementation, all the sensors are connected to the microcontroller through the wires. There is also LCD and stepper motor mounted on the board. A DC Power Supply of 5V is given to the microcontroller, stepper motor and to the sensors. Then the connection is made between the microcontroller and the sensors through serial communication. The Bluetooth works as a path to receive and transfer values for sensor for monitoring and input for controlling. Figure 2 shows the implementation of Android based Greenhouse Maintenance and Controlled System.

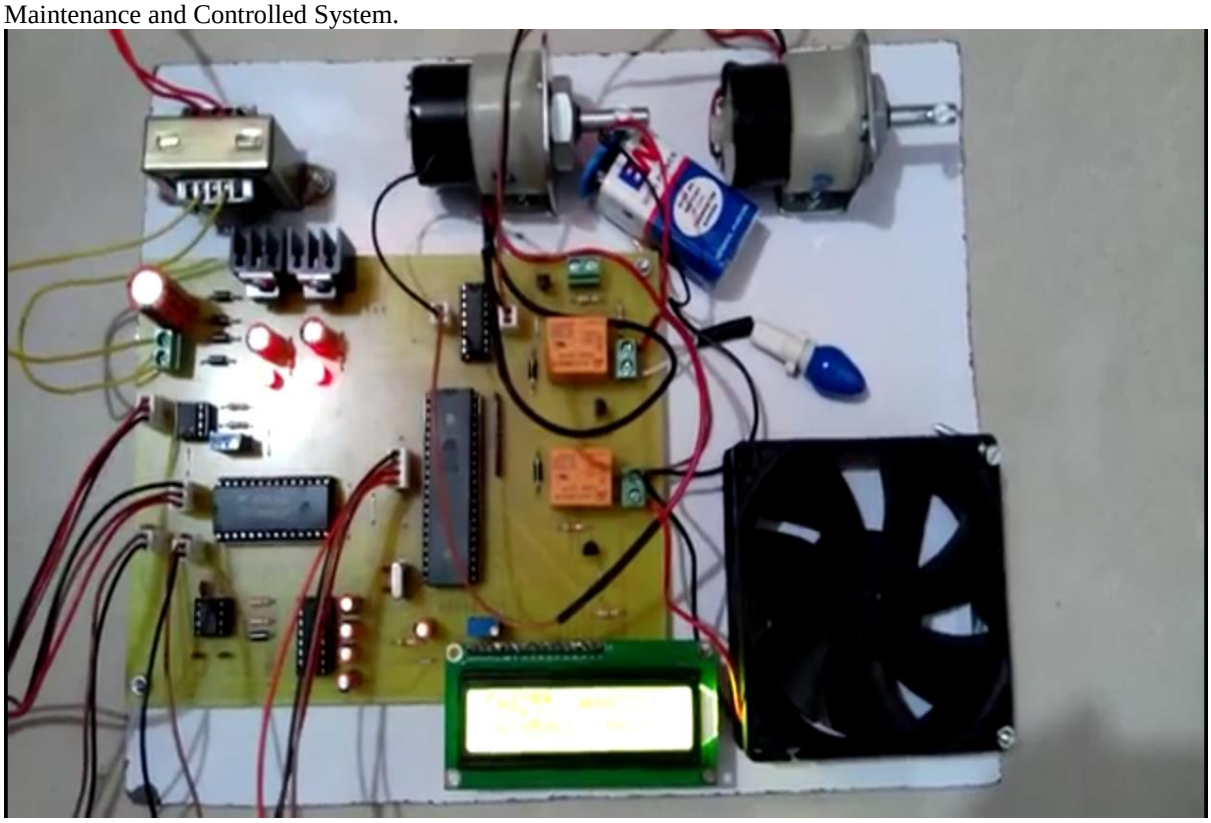

Figure 2: Implementation of Android based Greenhouse Maintenance and Controlled System

B. *Software Implementation:*

In Software Implementation, C program is used for measuring humidity, to send the value to Bluetooth modem and then to Android Smartphone using serial communication. PHP code is used for communication path and modules for application in android are written in C program.

VI. FUTURE SCOPE

In future, apart from Android phones, the system can be connected to other communication devices like modems or satellite terminal for enabling remote data collection. The system performance can be further expanded by increasing operating speed, memory capacity and instruction cycle period of microcontroller. Also we can use Wi-Fi, so that the system can be directly connected to the internet. Moreover, Time bound

administration of crop yielding materials like fertilizers, pesticides and insecticides can be introduced. To operate multiple greenhouses concurrently, a multi-controller system can be developed.

VII. CONCLUSIONS

In this project we are developing an automated system based on Android application for the maintaining and controlling of greenhouse. The system is combination of both android and embedded system. Thus we get the experience of studying embedded devices and communication protocol. The project shows how technology can reduce human efforts. Thus this project is a good learning experience.

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REFERENCES

[1] S. M. Metev and V. P. Veiko, Laser Assisted Microtechnology, 2nd ed., R. M. Osgood, Jr., Ed. Berlin, Germany: Springer-Verlag, 1998.
[2] J. Breckling, Ed., The Analysis of Directional Time Series: Applications to Wind Speed and Direction, ser. Lecture Notes in Statistics. Berlin, Germany: Springer, 1989, vol. 61.
[3] S. Zhang, C. Zhu, J. K. O. Sin, and P. K. T. Mok, "A novel ultrathin elevated channel low-temperature poly-Si TFT," IEEE Electron Device Lett., vol. 20, pp. 569–571, Nov. 1999.
[4] M. Wegmuller, J. P. von der Weid, P. Oberson, and N. Gisin, "High resolution fiber distributed measurements with coherent OFDR," in Proc. ECOC'00, 2000, paper 11.3.4, p. 109.
[5] Muhammad All Mazidi, The 8051 Microcontroller & Embedded Systems.
[6] Sumit Kumar,Mohit Kumar, Aswani Kumar,Praneet Garg, "Monitor and control of Greenhouse Environment 'The Project GreenBee", Bharat Institute of Technology Meerut
[7] R. E. Sorace, V. S. Reinhardt, and S. A. Vaughn, "High-speed digital-to-RF converter," U.S. Patent 5 668 842, Sept. 16, 1997.
[8] M. Shell. (2002) IEEEtran homepage on CTAN. [Online]. Available: http://www.ctan.org/tex-archive/macros/latex/contrib/supported/IEEEtran/
[9] S.Thenmozhi1 , M.M.Dhivya , R.Sudharsan , K.Nirmalakumari"Greenhouse Management Using Embedded System and Zigbee Technology",International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 3, Issue 2, February 2014
[10] Ai, Q., Chen, C., "Green House Environment Monitor Technology Implementation Based on Android Mobile Platform", IEEE Conference Publications. Page(s): 5584 -5587, 2011.
[11] website. [Online]. Available: http://www.Atmel.com
[12] Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specification, IEEE Std. 802.11, 1997.

