Open access Journal International Journal of Emerging Trends in Science and Technology
Impact Factor: 2.838 DOI: http://dx.doi.org/10.18535/ijetst/v3i02.14

Green House Remote Monitoring System Using Embedded Controlled Sensor Network

Authors
Mr Pravin D Auti[1], Prof. R. B. Sonawane[2]
[1]ME Student, Amrutvahini College of Engineering Sangamner, Maharashtra India
Email: *autipravin7@gmail.com*
[2]Associate Professor, Amrutvahini College of Engineering Sangamner, Maharashtra India
Email: *rbsonawane2007@rediffmail.com*

ABSTRACT
Embedded controlled sensor network is the technology which is used to implement Greenhouse monitoring solutions effectively. Many researchers have tried to improve the embedded controlled sensor network. Present systems are bulky, very costly and having high maintenance. The proposed system is cost effective and controlled by user friendly embedded systems. In this system ARM based microcontroller and wireless sensors are used to control the various parameters and to monitor the information regarding the environment in greenhouse using Zig bee and GSM technologies. This idea represents an effective implementation for control system used for monitoring regular required conditions of greenhouse by means of low cost ubiquitous sensing system. The description about the integrated network architecture and the interconnecting mechanisms for the reliable measurement of parameters by smart sensors and transmission of data via ZigBee is being presented. The framework of the monitoring system is based on a combination of pervasive distributed sensing units, information system for data aggregation, and reasoning and context awareness. Device control is a process that is done in the day to day life of mankind. Usually there are a number of devices associated with home and an efficient control of these systems is a tedious task. The rapidly advancing mobile communication technology and the decrease in costs make it possible to incorporate mobile technology into no. of systems. In this concept we can monitor the greenhouse environment and we can control the greenhouse loads using wireless communication i.e. ZigBee. Here temperature sensor and smoke sensor & humidity sensor will measure the temperature and presence of gas and water level of soil respectively in surroundings and it will send to Receiver. There are two loads; these are controlled from receiver controller through ZigBee network.

Keywords- *ECSN,GSM, ZigBee, Wireless Sensor Network, Sensors,ARM 7 Microcontroller (ARM LPC2148)*

INTRODUCTION

During certain hazards it is will be very difficult to monitor the parameter through wires and analog devices such as transducers. To overcome this problem we use wireless device to monitor the parameters so that we can take certain steps even in worst case. Few years back the use of wireless device was very less, but due the rapid development is technology now-a-days we use maximum of our data transfer through wireless like Wi-Fi, Bluetooth, ZigBee, etc. Greenhouse remote monitoring system based on ZigBee Technology designed on wireless

sensor network (WSN) is an ad-hoc network which uses sensors to monitor environmental conditions like temperature, humidity, water level and soil moisture and cooperatively pass respective data through the network to a main location. It has different parts like Transceivers, power supply, microcontroller. A wireless sensor network is made up of three major parts: Wireless sensor node, Gateway node and End user node. The wireless sensor node consists of sensors that collect different Environmental parameters and a transceiver system to transmit and receive the data. In this paper, we present a review of several current WSN methodologies contrasted under a number of different prototypes. These include components used; wireless communication standards used, range of coverage.

System Methodology

We have used different modules such as ZigBee, ARM based LPC2148TDMI-S microcontroller development board, 89S52 as controller, smoke Sensor, Temperature sensor, Soil Moisture sensor, and display the presence of smoke on 16X2 LCD on the transmitter side. If any gas exceeds the value automatically at the receiver side the particular functionality will be on condition. For example, the temperature is higher than a particular value the threshold, the fan will be ON condition at the receiver side. And the smoke sensor is activated then the buzzer will be ON, and the soil moisture is in dry condition then the motor will be ON and vice versa. This project uses sensors such as smoke Sensor (MQ-6), Temperature sensor (LM35) and Soil Moisture Sensor. Whenever hazardous gas is detected, a buzzer is connected to produce audible alert signal. And the sensor values are given to ADC to get processed by controller. The temperature sensor LM35 senses the temperature and converts it into an electrical (analog) signal, which is applied to the LPC2148TDMI micro controller through ADC. The analog signal is converted into digital format by the analog-to-digital converter (ADC).this project uses microcontroller LPC2148TDMI and AT89S52. The status will be messaged to the pre-stored number by using GSM module at the transmitter. This project uses two power supplies, one is regulated 5V. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer. The proposed system is cost effective and controlled by user friendly embedded systems. In this proposed system, we have designed two modules which consist of microcontroller, GSM module and ZigBee module. Transmitter module is designed using ARM Based LPC2148TDMI microcontroller, GSM module and ZigBee module. Control circuit is designed to control the various parameters of Greenhouse for short distance communication. GSM module is used for long distance control of devices and monitoring of environment of Greenhouse.

PROPOSED SYSTEM DESIGN

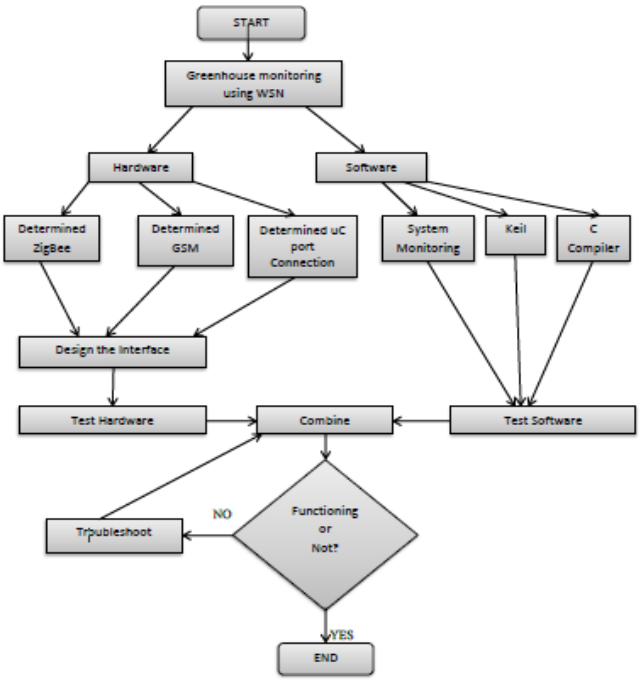

Fig 1 Proposed System Design

The Proposed architecture is being implemented for controlling and monitoring multiple parameters of Greenhouse. Greenhouse prevents the plant from the effects of climate; insect and so on, which makes great sense for agricultural production. Hardware and software requirements are as shown; all these are combined and tested whether it is functioning or not to implement the effective system.

BLOCK DIAGRAM

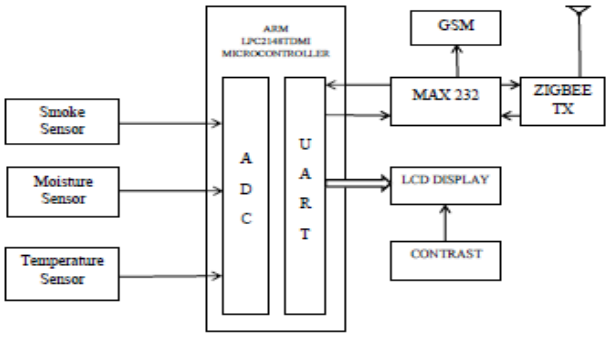

Fig 2 Transmitter Block Diagram

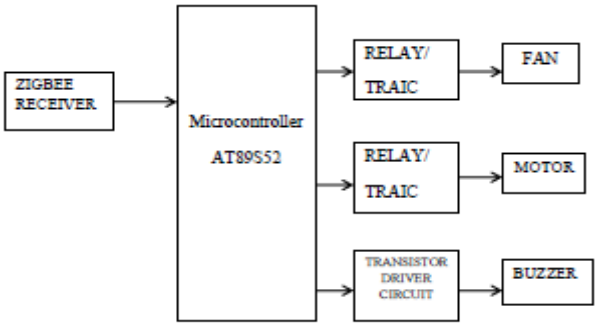

Fig 3 Receiver Block Diagram

In transmitter, we have used ARM7 based LPC2148TDMI Smicrocontroller.LPC2148 is 32/16 bit microcontroller with embedded high speed flash memory of 512 KB. For GSM communication we have used STM300, which is a tri band GSM/GPRS engine. The STM 300 is integrated with the AT commands and are developed to use TCP/TP protocol easily, which is very useful for data transfer applications. Zigbee technology is used for wireless networking. Zigbee technology offers simple communication and a cost effective funda to build, construct and remodel along with wireless technology.

CIRCUIT DIAGRAM

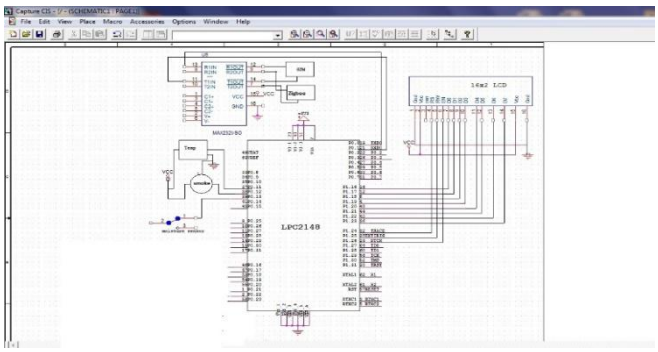

Fig 4 Transmitter Circuit Diagram

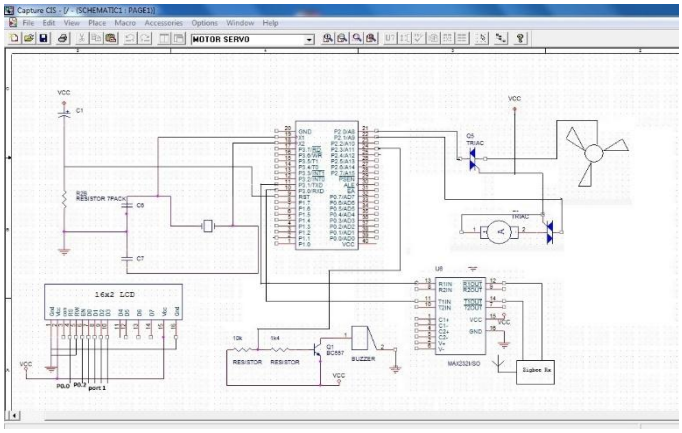

Fig 4 Receiver Circuit Diagram

The circuit diagram of the transmitter network designed using the ARM microcontroller, GSM module and Zigbee module and sensors for monitoring the greenhouse is as shown below in figure 4. In receiver module we have used 89S52 microcontroller along with zigbee module to receive the data which is send by the zigbee. The various sensors which are connected with the receiver module are smoke sensor, soil moisture sensor, temperature sensor.

CONCLUSION

The automation and high efficiency on Green house environment monitoring and control arecrucial. Applying ZigBee-based WSN technologies to greenhouses is a revolution for protected agriculture which overcomes the limits of wire connection systems. Such a system can be easily installed and maintained. In this we discussed the wireless solution of Greenhouse monitoring and control system based on ZigBee technology, and designed the wireless nodes, network establishment and control system. With the capabilities of self-organizing, self-configuring, self-diagnosing the ZigBee based monitoring and control system provides nearly unlimited installation flexibility for transducers, increases network robustness, and considerably reduces costs. We therefore, conclude that the ZigBee based monitoring and control system can be a good solution for Greenhouse monitoring and control. The sensor positions and the cooler fans and motor positions need to be identified by testing for the appropriate positions. In

the prototype made it is still possible to add two more sensors to the system along with two more fans and a motor and still display the temperature and soil humidity level detected from the added sensors in the LCD display. But by this means the Greenhouse would have two temperatures and soil water level control systems and these two systems can be used to monitor and control the temperature and soil water level in two sectors of a large Greenhouse. Using one temperature sensor for the whole Greenhouse is much suitable since light is falling equally into the Greenhouse and the sensor needs to be placed in a place where it is directly subjected to light from the sun and as well as from the light bulbs currently the temperature, and humidity is regulated around a particular value. But when implementing practically it is more efficient to regulate these parameters around range of values even though the values do not frequently change.

This paper demonstrates designing of embedded controlled sensor networks used for controlling the greenhouse parameters. The features of GSM and Zigbee are explored to design the system for long distance as well as short distance Embedded controlled sensor networks have proven themselves to be a good solution in providing remote control and sensing for greenhouse monitoring systems. Three commercial sensors had been integrated with the system to monitor and compute the level of existence of smoke, temperature and soil moisture in greenhouse using information and communication technologies.

ACKNOWLEDGEMENT

I am extremely grateful to Prof. R.B. Sonawane, for his guidance and support. I will forever remain grateful for the constant support and guidance extended by him. Through our many discussions, he helped me to form and solidify ideas. The invaluable discussions I had with him, the penetrating questions he has put to me and the constant motivation, has all lead to the development in this area.

REFERENCES

1. Vaneet Singh, I. P. Singh and S. K. Sud, "Environment monitoring and device controlusing ARM based Embedded Controlled Sensor Network", 978-1-4673-5301-4/13/$31.00©2013 IEEE
2. J. Burrell, T. Bro A. Camilli, C. E. Cugnasca, A. M. Saraiva, A. R. Hirakawa, and P. L.P. CorrAea. "From wireless sensors to field mapping: Anatomy of an application forprecision agriculture". Comput. Electron. Agric., 58(I):25-36, 2007.
3. Rohit.K.Nikhade, S.L.Nalbalwar "Monitoring Greenhouse using Wireless SensorNetwork" International Journal of Advanced Computer Research Volume-3 Number-2 Issue-10 June-2013.
4. Salleh, M. K. Ismail, N. R.Mohamad, M. Z. A Abd Aziz, M. A. Othman, M. H. Misran"Development of Greenhouse Monitoring using Wireless Sensor Network through ZigBeeTechnology" International Journal of Engineering Science Invention Volume 2 Issue 7 ǁ July.2013 ǁ PP.06-12.
5. Purnima and S.R.N. Reddy.,"Design of Remote Monitoring and Control System withAutomatic Irrigation System using GSM- Bluetooth, "International Journal of ComputerApplication, June 2012.
6. Anuj Kumar, Abhishek Singh, I. P. Singh, and S.K. Sud Prototype Greenhouse Environment Monitoring System Proceedings of the International Multic onference of Engineers and Computer Scientists 2010 Vol II, IMECS 2010, March 17-19, 2010.\
7. Teemu Ahonen, Reino Virrankoski and Mohammed Elmusrati, Greenhouse Monitoring with Wireless Sensor Network, Department of Computer Science Telecommunication Engineering Group. University of Vaasa, 2003
8. Jin-Shyan Lee, Yu-Wei Su, and Chung-Chou Shen, Comparative Study of WirelessProtocols: Bluetooth, UWB, ZigBee,

and Wi-Fi, the 33rd Annual Conference of the IEEEIndustrial Electronics Society (IECON) Nov. 5-8, 2007, Taipei, Taiwan

9. Miss.Vrushali R. Deore, "Prof. V.M. Umale. "Wireless Monitoring of the Green HouseSystem Using Embedded Controllers", International Journal of Scientific & Engineering Research Volume 3 Issue 2 Feb 2012
10. Shivaraj B Nataraj Urs HD "Wireless Sensor Networks for Environmental Monitoring:A Theoretical Review" IJRD VOL 2 ISSUE 4 APRIL 2015 Paper 16