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DESIGN OF ENERGY EFFICIENT SMART WIRELESS SYSTEM FOR STUDY OF GREEN HOUSE PARAMETERS USING GSM TECHNOLOGY

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ABSTRACT:

This paper represents the modeling and optimizations on advanced GSM (800-900MHz)-WSN (IEEE 802.15.4) based greenhouse monitoring and controlling with SMS and GPRS terminal. 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 Analogic 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 Analogic 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. Analogic.The communication between the sensor station and base station is achieved via Analogic's GSM smart modem and base station to user is achieved via GSM network and sensors can monitored on web page. By employing GSM Terminal access to proposed system, field parameter has been accessed by using conventional SMS and GPRS facility.

Keyword: - Base station, GSM (800-900MHz)-WSN (IEEE 802.15.4),ECSN, Analogic GSM smart modem, greenhouse conditioning, sensor station, ARM 7 Microcontroller (ARM LPC2148).

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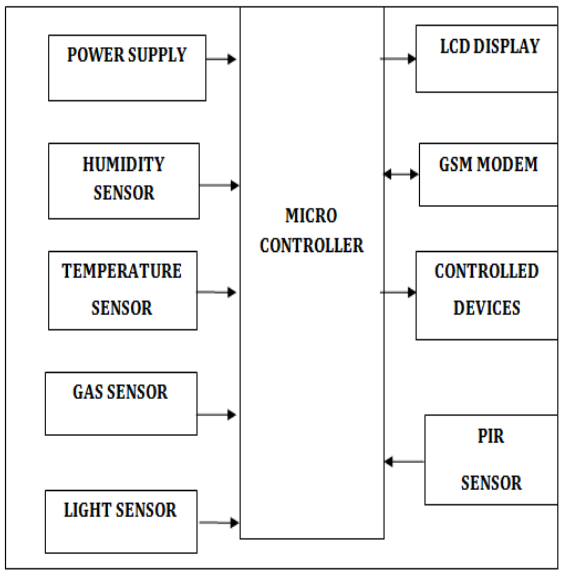
INTRODUCTION:

THE ability to move freely is highly valued by all people. However, it is sometimes difficult for a person with In the previous decade a poly house concept was implemented by which real time controlling against the field environment like temperature, light intensity, humidity, soil moisture were done manually. The control action had done in a way that the sensor from sensing station or a sensing system generates the output related to the estimated parameter but it seems lack of general purpose automation system . Furthermore, the implementation of the green house had done by using conventional embedded electronic system, they implemented general purpose microcontroller such as ARM family for monitoring the field parameters achieving the expected accuracy within them. The ARM board with relay circuitry has employed to drive the output circuitries such as fans, water pumps, etcetera which was semi-automated. For remote sensing and manipulation of the input output terminals within the system was implemented by using wireless technology named as Analogic GSM Smart Modem and wireless sensor technology (WSN). It supports multiple sensing topologies which collect the more number of parameters from different sensor nodes within field by using Analogic GSM Smart Modem and conventional ARM based embedded systems. But the system limits the fully automated environment .The ARM based automated wireless greenhouse monitoring system by using Analogic GSM Smart Modem technology has implemented for communication between sensor station and base station with in the desired greenhouse field which allows sensor embedded system to be interface with general purpose Analogic GSM Smart Modem network for remote sensing as well as monitoring the field for long distances. The acquired parameters from field were collected with Analogic GSM Smart Modem system can be further processed by using commercial hand held dedicated terminals which uses the Analogic GSM Smart Modem based trans-receiver system which allows to coordinator for initiating the manipulating commands. By implementing controlling strategies via fully WSN with accommodation of computer system which allows the mobility function over a land based computer system to fieldsmen so that he would be able to monitor as well as control the field parameters from any serving location.

Block Diagram:



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SYSTEM METHODOLGY:

We have used different modules such as Analogic GSM Smart Modem, ARM based LPC2148TDMI-S microcontroller development board, 16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package, micro controller MAX232 serial line driver, 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-S 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 MAX232 serial line driver. The status will be messaged and data to the pre-stored number by using GSM module at the transmitter. This project uses two power supplies, one is regulated 5V.LM 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 Analogic GSM Smart Modem module. Transmitter module is designed using ARM Based LPC2148TDMI microcontroller, GSM module and Analogic GSM Smart Modem 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.

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.

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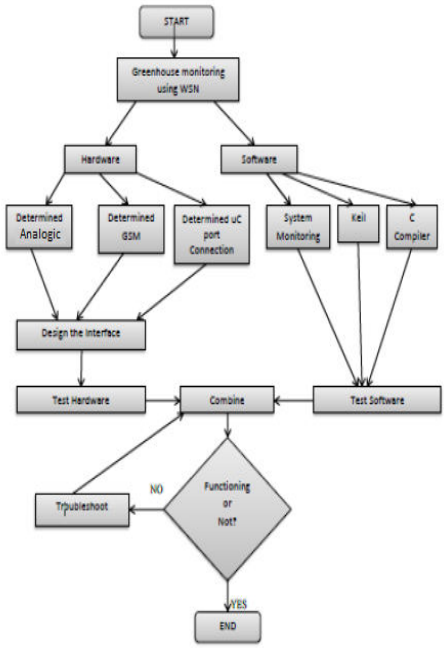
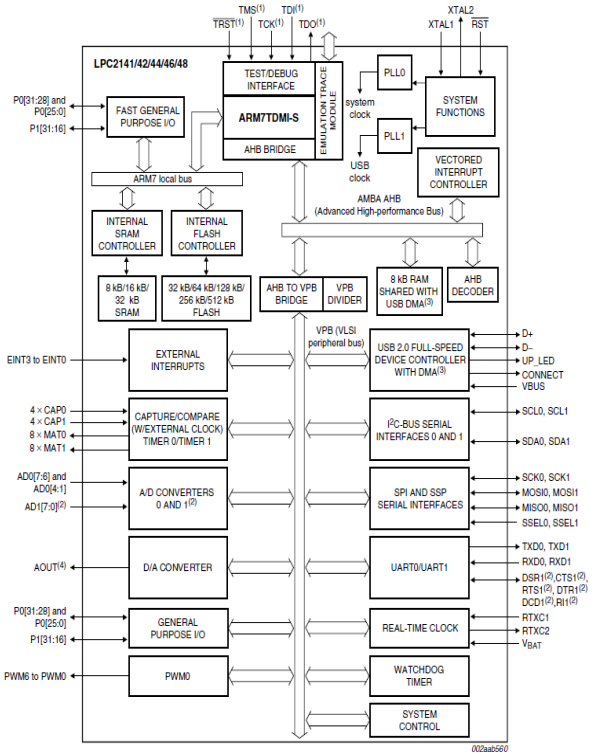
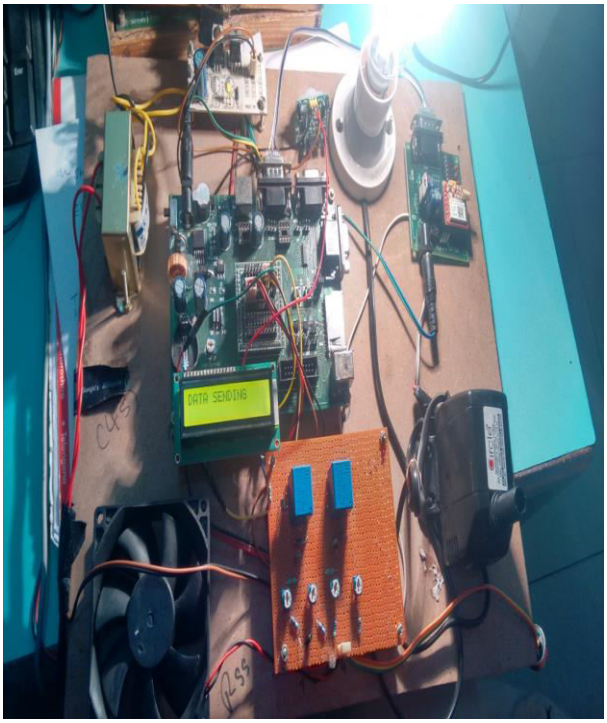
PROPOSED SYSTEM DESIGN



LPC2148 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. Analogic GSM Smart Modem technology is used for wireless networking. Analogic GSM Smart Modem technology offers simple communication and a cost effective fundamental to build, construct and remodel along with wireless technology.



(1) Pins shared with GPIO.
(2) LPC2144/46/48 only.
(3) USB DMA controller with 8 kB of RAM accessible as general purpose RAM and/or DMA is available in LPC2146/48 only.
(4) LPC2142/44/46/48 only.



1)GSM Module is sending the data to the system which is connected to Internet.

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RESULT:

Data sent to the system

b) Output Observed on web page

c) Output displayed on LCD

CONCLUSION:

The automation and high efficiency on Green house environment monitoring and control arecrucial. Applying Analogic GSM Smart Modem-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 Analogic GSM Smart Modem technology, and designed the wireless nodes, network establishment and control system. With the capabilities of selforganizing, self-configuring, self-diagnosing the Analogic GSM Smart Modem based monitoring and control system provides nearly unlimited installation flexibility for transducers, increases network robustness, and considerably reduces costs. We therefore, conclude that the Analogic GSM Smart Modem 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 Analogic GSM Smart Modem 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. It can be kept long distance, real time monitoring for parameter of green house and information can be obtained of greenhouse at any time. It can be used in agriculture vegetable greenhouse to monitor and control the environmental parameters. It can be implemented to various crops in green house to control and monitor parameters in it.

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