GSM BASED GREENHOUSE MONITORING SYSTEM FOR AGRICULTURAL FIELD

B. Guraiah,
(12691d3807), M.Tech Student, MITS, guraiah.12@gmail.com

Mrs. G. Nagaswetha,
Asst. Professor, MITS, nagaswethag@mits.ac.in

ABSTRACT:
The wealth of any country depends on many factors; one of them also depends on growth in agricultural sector. Nowadays, the most significant factors which affect the agricultural field are greenhouse parameters, namely water supply, temperature, humidity, light intensity and air circulation. Crop supervision is depending on the above parameters. India is a big agricultural dependency country. So many farmers are living based on the agricultural field. So by monitoring and controlling of these greenhouse parameters, we can easily increase the crop productivity and it is very useful for crop management. But so many farmers are not adopting this technology due to its high cost. In this paper we introduce a novel method, which is user-friendly and low cost. In this method mainly we use a ARM7 microcontroller, which works as a controlling unit. For monitoring and controlling of greenhouse, we write the code in Keil software and load into ARM7 with help of flash magic. Various wireless sensors are connected to microcontroller and the monitoring values will display on LCD and as well as in GPRS webpage with help of GSM. We predefined the greenhouse parameter values in the code. Whenever the monitoring values go beyond the predefined values then controller will take the auxiliary Controlling actions with assist of relays, which are associated to controller.

KEYWORDS:
ARM7 (Advanced RISC Machine), wireless sensors, keil software, Flash magic, relays.

INTRODUCTION:
Agricultural field shows a foremost title role in the most of the countries. There are so many countries which are not doing the irrigation. All of them were educated people or doing some their own jobs. Currently so many of peoples were stopping the agricultural field and they are doing some other works. Because there is no enough crop management and the production. Still some of the farmers are doing the agricultural in previous methods. But majority of the farmers in India are unable to increase the crop production even the technology has been developing. They are using all this technology for their agricultural needs. Greenhouse parameters were plays an important role in irrigation. Temperature, humidity, and light intensity values can monitor and control by using this method. So we can easily increase the production rate and also the food scarcity will decrease.

BLOCK DIAGRAM:

HARDWARE IMPLEMENTATION:
In this paper we use three sensors, for monitoring the environmental conditions, ARM7 LPC2148 microcontroller, GSM module and LCD displays as hardware units.

1). Sensors:
A). Temperature sensor:
For any type of fields, temperature must be mandatory for the plant growth. This is the main factor for plant growth because for the demanding temperature only the plant can live. Even if the
temperature is high or low, the field cannot give maximum efficiency. This sensor continuously measures the temperature values present in the atmosphere and sends these values to microcontroller. We already predefined day temperature for plant growth required is around $26^\circ c$ to $30^\circ c$ and night temperature is around $15^\circ c$ to $18^\circ c$.

**B). Humidity sensor:**
This sensor also continuously monitors the humidity present in surroundings and sends to microcontroller with help of inbuilt ADC function. For the flower type fields, 70% to 80% humidity need remains sustained and for vegetables 60% to 70% humidity is necessary.

**C). Light intensity sensor:**
This sensor will scrutinize the light intensity nearby in the atmosphere and sends to microcontroller. The proper light intensity required for plant growth is 50,000 to 60,000 LUX. But in India the light intensity is nearly 40,000 to 1, 40,000 LUX.

**2). Microcontroller:**
The selected microcontroller is ARM7 LPC2148 controller. This is the heart of our project and it will acts as a controlling unit. All the controlling actions were performed by this unit. All the peripherals, which we are using in this project, are under the control of this unit. Because of its features compare to some other microcontrollers, ARM7 has more advantages in its pin configuration and memory usage and I/O pins.

The embedded code will load in to ARM7 microcontroller. At this control unit, we can do any changes in the code based on user requirement and we can change the predefined greenhouse parameter values. For embedded programming we are using Keil version 3.0 web pack software tool, which is easy to understand and can download easily from the internet. 3). Relays:
Relays are the small machinery, which are used for controlling peripheral interfacing. The control peripherals may be shade nets, cooling fan system, humidifiers and foggers.

Relays connected are-

For temperature:
- i. Cooling fans
- ii. High heat lamps

For humidity:
- i. Humidifiers
- ii. Foggers

For light intensity:
- i. Shade nets
- ii. Ventilation (by opening side nets)

**4). LCD display:**
LCD display is used for displaying the continually monitored values from the sensors. All the sensor values will be displayed on the LCD. Based on that user can observe all the temperature, humidity and light intensity values. Without user involvement automatically controlling actions were performed whenever the present greenhouse values exceeds the user predefined values. In this project we use 16*2 LCD display. Based on our requirement we can select any type of LCDs.

**5). GSM (Global System for Mobile Communication):**
With the help of GSM wireless systems only, a GSM modem works and it is a wireless device. This modem is maintained and controlled by using AT commands. GSM modems and dial-up modems both uses the same common AT commands. Widely we can use the GSM modem as a dial-up modem. The RS232 serial bus acts as a communication interface device between GSM modem and ARM microcontroller. Usually, an outward GSM device is accompanying to a PC through a USB cable. A GSM modem also requires a SIM card, like our GSM phones to operate.

**6). PC Section:**
This section basically contains a PC with Serial communication associated hardware. Apart from this, the web cam is also connected to the PC. The serial communication associated hardware circuitry includes the bus (DB 9) connector from PC to Microcontroller.

**SOFTWARE IMPLEMENTATION:**
In this project, we use the Keil software version 3.0 web pack software which is easily available in the internet. Embedded C is used for
the programming because of its highly reliable and fast execution. ARM7s are more appropriate and fast execution in Keil web pack by using embedded C code language. The architecture of the ARM7 is more suitable and easily accessible for present code software like as Keil. In addition the ARM7 microcontrollers contain wide range of applications and bandwidth requirement and voltage requirements. Keil version web pack is user friendly software tool, which is having many superior developed programs. The program can be downloading into device easily by using parallel ports.

Software design:
1). Temperature:
First set the temperature as Htemp, Ltemp. Now
A). If temp > Htemp
Then automatically cooling fans relays will ON.
B). If temp < Ltemp
Then automatically lamps relay, which will produce some heat, will ON.
2). Humidity:
Now set the humidity as Hhum, Lhum. Then
A). If hum > Hhum
Then automatically foggers relay, which will decreases humidity, will ON.
B). If hum < Lhum
Then mechanically humidifiers relay, which will increases the humidity, will ON.
3). Light intensity:
Now set the light intensity as Hli, Lli. Then
A). If li > Hli
Then routinely shade net relays will ON and it will cover the field.
B). If li < Lli
Then light relays, which will give light, will ON.

RESULTS AND DISCUSSIONS:
The main goal of this project is to achieve a high production from the crops and reduce the man power in the irrigation. By using this project we are sinking the human work instead of daily monitoring and again there is no need of person for monitoring the crops daily. With help of this present system, even though there are no good environmental conditions, we are providing exact and necessary conditions for proper growth of plants in artificial way. Then the plants growth will be good and the crop production rate increases.

The greenhouse parameters present in the environment may affect the crops very badly in some particular seasons and areas. So by using this system we can avoid all those conditions. This system is easy to understand and operate. In addition we can reduce the food scarcity in India with the help of this system.

FUTURE SCOPE:
The program can extend for n-controlling greenhouse parameters.
The project can be extending by using the webcam at the monitoring side.
By using the system, continuously we can save and observe the greenhouse parameter values. Other control parameters like water supply, soil moisture and pressure sensors can be add.
This project can implement by using FPGAs also. We can find out the variations in the controlling parameter values in different environmental conditions not only in irrigation field.
By using huge systems in different areas, we can easily reduce the greenhouse effect.

REFERENCES:


Issue 6, June-2013 1769 ISSN 2229-5518.


[8]. www.ARM7TDMIdatasheets.com

[9]. LPC2148datasheets.com