

Automated Green House Management Using GSM Modem

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Abstract - The system proposed in this paper collects 'Green House Effect' is the technology to provide plants and trees the required nourishment from the sunlight and to prevent the same from the harmful rays/effects of sunlight. As well as greenhouse environmental information such as temperature, maintaining light intensity as well as fulfilling water requirements etc. Accordingly, monitoring crop itself is as important as monitoring indoor environments. Using these collected greenhouse environmental data, indoor environments can be more effectively controlled, and monitoring crop itself can contribute to improve productivity and to prevent crops from damages by harmful sun ray. In addition, it will be possible for farmers to do control plant growth through closely studying relationship between indoor environmental information and monitored information on crop itself. It is made possible to collect information and control effectively and automatically greenhouse in the site or from a remote place through GSM modem. System components are: temperature sensor, humidity sensor, leaf temperature sensor, leaf humidity sensor, Rain Sensor, Transistor switches, relay nodes for automatic control, and data server to store greenhouse information. The system is implemented using low power wireless components, and easy to install.

Keywords: Greenhouse Auto-control, GSM modem, Temperature.

I. INTRODUCTION

From last few years, there has been a popularity rise of computers for control of greenhouse. The main improvements in computer based climate control are found in data logging [1] Greenhouse cultivation represents a very important role in modern agriculture. As the greenhouse usually equips with various high-tech equipments, management tend to be very complex. A fully automated greenhouse control systems bring obvious benefit such as labor saving, but far more importantly, it enables improved quality of produce and information gathering that will make difference between earning a profit and suffering substantial losses. Environmental condition has been significant effect on the plant growth. The greenhouse structure represents both the barrier to direct contact to the external environment and the containment of the internal environment to be controlled. The covering material by design allows for maximum light penetration for growing crops. All plant required certain for their proper growth. Greenhouses can be divided into glass greenhouses and in plastic greenhouses. Commercial glass greenhouses are often high tech production facilities for vegetables or flowers. The glass

greenhouses are filled with equipment like screening installations, heating, cooling and lighting and may be automatically controlled by a computer. The glass used for a greenhouse works as a selective transmission medium for different spectral frequencies, and its effect is to trap energy within the greenhouse, which heats both the plants and the ground inside it. This warms the air near the ground, and this air is prevented from rising and flowing away. This can be demonstrated by opening a small window near the roof of a greenhouse: the temperature drops considerably. This principle is the basis of the auto vent automatic cooling system. Greenhouses thus work by trapping electromagnetic radiation and preventing convection. The goal for this project is create a system which will automatically control light intensity, controlling soil and air temperature, Rain Detection and provide preventive measurement about fire in a greenhouse in order to aid in the growth of plants of all types.

II. LITERATURE REVIEW

Greenhouse Automation Solution which senses, processes and stores temperature values. Managing temperature by comparing the measured values with the expected ones and take action if it is necessary. The solution aims are flexibility, maintainability and usefulness. Following terms associated with it and infused into the system.

A. Temperature Sensor - The Thermostat

Thermostats are inexpensive, easily-obtainable temperature sensors. They are easy to use and adaptable. Circuits with thermostats can have reasonable output voltages - not the mill volt outputs thermocouples have. Because of these qualities, thermostats are widely used for simple temperature measurements. They're not used for high temperatures, but in the temperature ranges where they work they are widely used.

Thermostats are temperature sensitive resistors. All resistors vary with temperature, but thermostats are constructed of semiconductor material with a resistivity that is especially sensitive to temperature. However, unlike most other resistive devices, the resistance of a thermostat decreases with increasing temperature. That's due to the properties of the semiconductor material that the thermostat is made from. Here is a graph of resistance as a function of temperature for a typical thermostat. Notice how the resistance drops from 100 kW, to a very small value in a range around room temperature. Thermostats are most commonly used in bridge circuits like the one below.

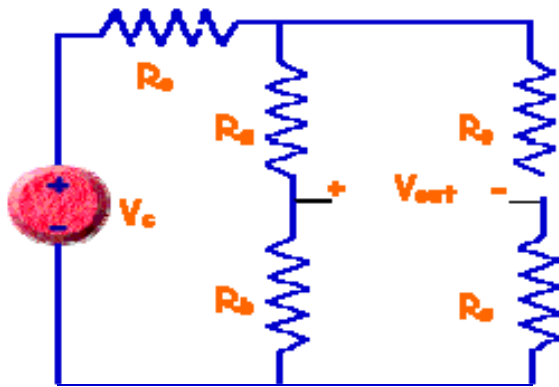


Figure 1. Bridge circuit for thermostat

In this bridge circuit, three resistors are constant, R_a , R_b , and R_c , while the resistive sensor, R_s , varies depending upon some physical variable - like temperature, light level, etc. The thermostat can be placed anywhere in the bridge with three constant resistors, but different placements can produce different behavior in the bridge. For example, different placements might cause the output voltage to go in different directions as the temperature changes.

B. The Light Sensor

A light dependent resistor is a semi-conducting material (rather like Silicon) [3]. By shining a light onto an LDR, the light "injects" energy into the semiconductor which is absorbed by co-valently bonded electrons. This energy breaks the bonds between atoms. The electrons become delocalized and are free to move within the LDR. This leads to a larger current (smaller resistance) flowing in the semiconductor. Thus the resistance of a Light Dependent Resistor decreases with increasing Illumination. This is used in cricket light meters and burglar alarms etc.

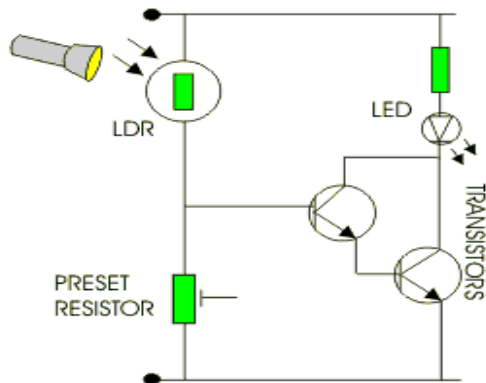


Figure 2. Light dependent resistor

C. Rain Sensor

Here we are using touch plate switch as a water sensor. It is used to detect rain. As water drop fall on it, LED glows, an acknowledgement message is received on your mobile that rain has been detected [4]. Here not only the acknowledgement message is received but also one automatic mechanism is provided using which the shade will get close.

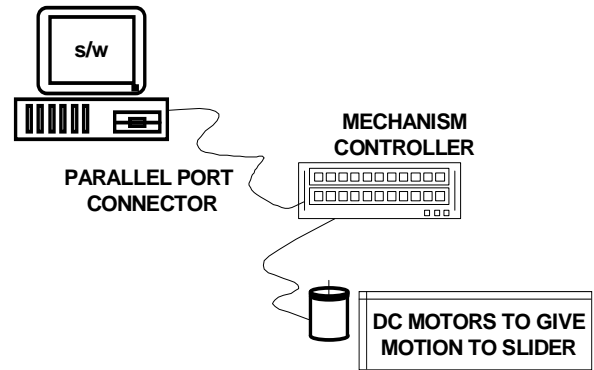


Figure 3. Controlling the DC Motor

Connection make with motor to circuit using wires and circuit to system using the parallel port. This is the connection sequence. As we know that transistor can act like switch so use this concept to control DC motors. We connect transistor to motor circuit as a switch and to operate this switch we pass current to it using the parallel port. This is basic concept of the rotation controlling of the project.

D. GSM Modem

GSM (Global System for Mobile communication) is a digital mobile telephone system that is widely used in Europe and other parts of the world [3]. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1,800 MHz frequency band.

1. Access control devices

Now access control devices can communicate with servers and security staff through SMS messaging. Complete log of transaction is available at the head-office Server instantly without any wiring involved and device can instantly alert security personnel on their mobile phone in case of any problem. Biennale is introducing this technology in all Finger print access control and time attendance products. You can active high security and reliability.

1. Applications of GSM communication

- **Short Data Size:** You data size per transaction should be small like 1-3 lines. E.g. banking transaction data, sales/purchase data, consignment tracking data, updates. These small but important transaction data can be sent through SMS messaging which cost even less than a local telephone call or sometimes free of cost worldwide.
- **Multiple remote data collection points:** If you have multiple data collections points situated all over your city, state, country or worldwide you will benefit the most. The data can be sent from multiple points like your branch offices, business associates, warehouses and agents with devices like GSM modems

connected to PCs, GSM electronic terminals and Mobile phones.

- **High uptime:** If your business require high uptime and availability GSM is best suitable for you as GSM mobile networks have high uptime compared to landline, internet and other communication mediums.
- **Large transaction volumes:** GSM SMS messaging can handle large number of transaction in a very short time. You can receive large number SMS messages on your server like e-mails without internet connectivity. E-mails normally get delayed a lot but SMS messages are almost instantaneous for instant transactions.
- **Mobility, Quick installation:** GSM technology allows mobility, GSM terminals, modems can be just picked and installed at other location unlike telephone lines. Also you can be mobile with GSM terminals and can also communicate with server using your mobile phone.

III. PROBLEM DEFINITION

The greenhouse management system will fully automate the management of a greenhouse using the latest pervasive systems and technology. The proposed system will control and monitor light intensity, soil temperature, and air temperature control light intensity, controlling soil and air temperature, Rain Detection and provide preventive measurement about fire in a greenhouse. This will be done using a two Modem and a Wireless network.

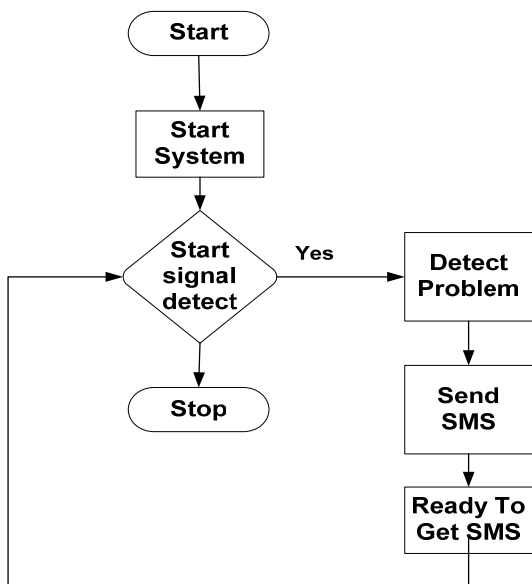


Figure 4. Project Data Flow Diagram

Above diagram denote that if the Main system detects the signal, system will analyzed the signal and detect the problem and send the comment message to system and system will start its operation to prevent the hazards.

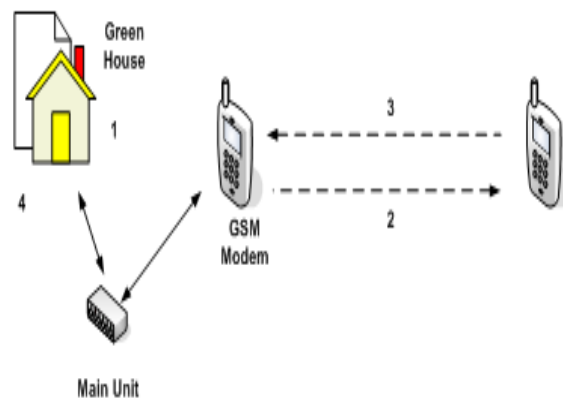


Figure 5. Proposed Model of Green House System

Figure 5. denote that the main system identified the hazardous condition then GSM modem activated and send the message to another modem which is connected to computer system and Computer system store the log of SMS received and send and New SMS send to first GSM and after receiving SMS, main unit can starting the operation on green house system.

IV. IMPLEMENTATION

Implementation encompasses all the processes involved in getting new software or hardware operating properly in its environment, including installation, running, testing and making necessary changes. As such, implementation is the action that must follow any preliminary thinking in order for something to actually happen.

My project worked in divided into three sub module

A. Signal Detector

Here we are creating a window for user interface. As soon as the fire or rain absence of light has been detected, GSM modem sends SMS on a number provided in a textbox. Through this module user can manage Green House Hardware or manage the SMS service.

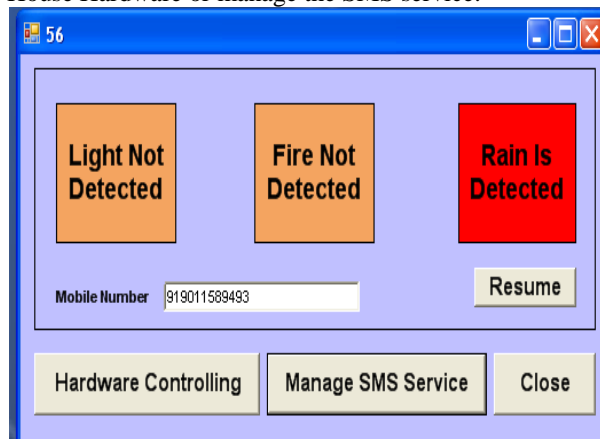


Figure 6. Signal Detector

B. Hardware controlling

This module is used to control environmental condition and provide optimal condition to the plain which are kept in Green House.



Figure 7. Hardware controlling

C. SMS Service for Green House Controlling

Here for controlling Hardware through SMS Service, we have to follow the following steps:

- Select the com port no
- Select the memory (SIM/Phone) for storing message
- Select the option if you want to delete message after receive
- Click on “start SMS service button”
- Wait until it shows “success” message
- After that as it will get SMS for performing specific action, the task get completed.
- Click on “Stop SMS service button” if you want to stop the service.

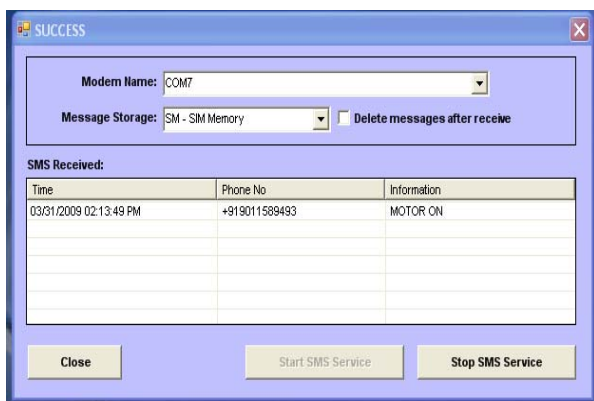


Figure 8. Receiving SMS from remote user

V. APPLICATION

- This application is used to Controlling Temperature at difference degree Celsius for example Bambusa ventricosum tree required 25 to 30⁰ C for healthy growth.
- This application provide mechanism for Controlling motor pump proper drip irrigation

- This application providing facility of open and close shade for variable light i.e. Sun rays to different environmental condition.
- This application can detect critical condition like detect fire, detect absence of light and detect rain.

VI. CONCLUSION

This paper describes the design of fully automated green house management system. From the experiment it could be seen that it is fulfilling all requirements related green house monitoring. The automatic greenhouse sensor design could help in increasing the productivity of plants. As it has been mentioned earlier, we are not only providing automatic control over the devices like shade, light, motor pump but also tackling with the critical conditions like fire, absence of light and rain. Thus this construction, productivity of cropping can be continuously increased so it can handle famine problem around the world. We are also introducing the facility that provides remote access control to user.

VII. REFERENCES

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