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Green House Project Using GSM Module

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ABSTRACT: Greenhouses Environment Control System form an important part of the agriculture and horticulture sectors in our country as they can be used to grow plants under controlled climatic conditions for optimum produce. Appropriate environmental conditions are necessary for optimum plant growth, improved crop yields, and efficient use of water and other resources. Automation is process control of industrial machinery and processes, thereby replacing human operators. The soil moisture conditions, environment temperature and various climatic parameters govern plant growth. Automating the data acquisition process allows this information (soil moisture, temperature and various climate parameters) to be collected at high frequency with less labour requirements.

Our main focus in this [project](#) is to design a simple, easy to use, micro – controller based circuit which monitor and record the values of temperature, humidity, soil moisture and sunlight of the natural environment that are continuously modified and controlled. This helps in achieve maximum plant growth and yield. We use in this circuit a low power, cost efficient chip manufactured by ATMEGA 328

It communicates with the various sensor modules in real-time in order to control the temperature, soil moisture, humidity and day light inside a greenhouse by actuating a cooler, water pump, sprayer and lights respectively according to the necessary condition of the crops. There is a 16×2 character LCD is also used for displaying the information getting from various sensors. This [project](#) provides economical, portable and a low maintenance solution for greenhouse environment

A properly configured soil moisture sensor can save up to 60 percent of water used in irrigation. The designed system can be used in turf grass or with small garden plants.

I. INTRODUCTION

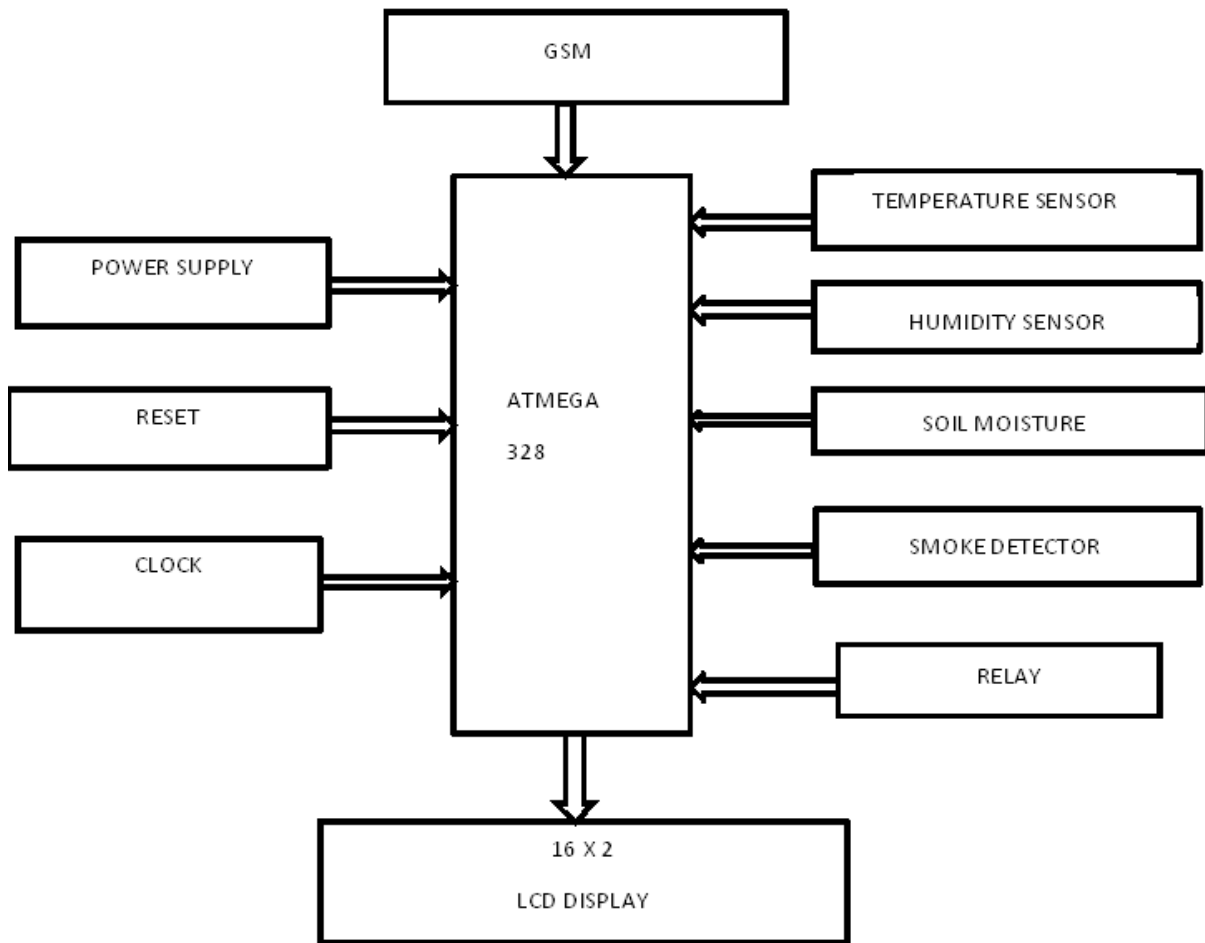
Green House project using GSM Module

A greenhouse is a structure with a glass or plastic roof and frequently glass or plastic walls; it heats up because incoming solar radiation from the sun warms plants, soil, and other things inside the building. In other word, a greenhouse is a structure usually made of glass or clear plastic that provides protection and a controlled environment for raising plants indoors. Water is the most important element in our life. Without it, we cannot survive. As we know, most of the gar-dener uses manual system to their plant in the garden and also in the greenhouse. This system is inefficient. When we manu-ally do this, the possibility to get some plant can drown. In order to overcome this problem, automatic greenhouse used.

II. BLOCK DIAGRAM OF GREENHOUSE USING GSM MODULE

Parts of the system:

1. Sensors (Data acquisition system)
 - a) Temperature sensor (LM35)
 - b) Humidity sensor (SYSH 220)
 - c) Soil Moisture sensor
2. Microcontroller (AT MEGA328)
3. Liquid Crystal Display (Hitachi's HD44780)
4. Actuators – Relays
5. Devices controlled



Soil moisture sensor

Features of the Soil moisture sensor

1. The circuit designed uses a 5V supply, fixed resistance of 100Ω, variable resistance of 10KΩ, two copper leads as the sensor probes, 2N222N transistor.
2. It gives a voltage output corresponding to the conductivity of the soil.
3. The conductivity of soil depends upon the amount of moisture present in it. It increases with increase in the water content of the soil.
4. The voltage output is taken at the transmitter which is connected to a variable resistance. This variable resistance is used to adjust the sensitivity of the sensor.

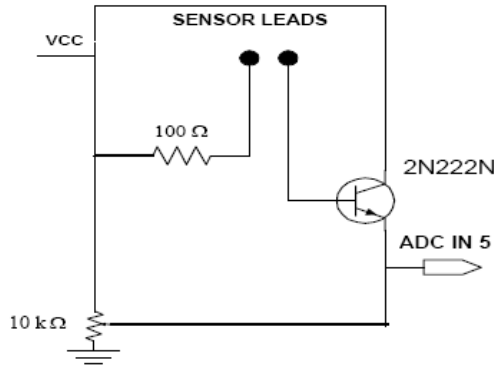


Figure.4.3 Soil moisture sensor

Functional description of Soil moisture sensor

The two copper leads act as the sensor probes. They are immersed into the specimen soil whose moisture content is under test. The soil is examined under three conditions:

Case#1: Dry condition- The probes are placed in the soil under dry conditions and are inserted up to a fair depth of the soil. As there is no conduction path between the two copper leads the sensor circuit remains open. The voltage output of the emitter in this case ranges from 0 to 0.5V.

Case#2: Optimum condition- When water is added to the soil, it percolates through the successive layers of it and spreads across the layers of soil due to capillary force. This water increases the moisture content of the soil. This leads to an increase in its conductivity which forms a conductive path between the two sensor probes leading to a close path for the current flowing from the supply to the transistor through the sensor probes. The voltage output of the circuit taken at the emitter of the transistor in the optimum case ranges from 1.9 to 3.4V approximately.

Case#3: Excess water condition- With the increase in water content beyond the optimum level, the conductivity of the soil increases drastically and a steady conduction path is established between the two sensor leads and the voltage output from the sensor increases no further beyond a certain limit. The maximum possible value for it is not more than 4.2V.

**Hardware Description
Microcontroller (AT MEGA 328):**

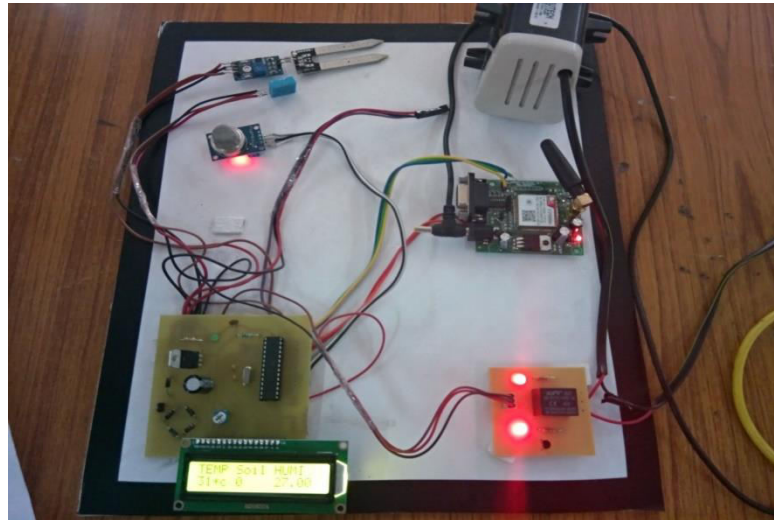
DESCRIPTION

The AT MEL328 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel’s high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel 328 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications

ON-CHIP MEMORY

This refers to any memories (Code, RAM or other) that physically exist on the Microcontroller itself. On-Chip memory can be of several types. The 328 has a bank of 128 bytes of Internal RAM. This internal RAM is available and it is also the most flexible in terms of reading, writing, and modifying its contents. Internal RAM is volatile, so when the 328 is reset this memory is cleared. The first 8 bytes (00h-07h) are “register bank 0”. By manipulating certain SFRs, a program may choose to use register banks 1, 2 or 3. These alternative register banks are located in internal RAM in addresses 08h through 1Fh. Bit memory also lives and is part of internal RAM. The 80bytes remaining of Internal RAM, from addresses 30h through 7Fh, may be used by user variables that need to be accessed frequently or at a high speed. This area is also utilized by the microcontroller as a storage area for the operating stack.

III. RESULT



IV. CONCLUSION

A step-by-step approach in designing the microcontroller based system for measurement and control of the four essential parameters for plant growth, i.e. temperature, humidity, soil moisture, and light intensity, has been followed. The system has successfully overcome quite a few shortcomings of the existing systems by reducing the power consumption, maintenance and complexity, at the same time providing a flexible and precise form of maintaining the environment. The continuously decreasing costs of hardware and software, the wider acceptance of electronic systems in agriculture, and an emerging agricultural control system industry in several areas of agricultural production, will result in reliable control systems that will address several aspects of quality and quantity of production.

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2. [^] Janick, J; Paris, HS; Parrish, DC (2007). ["The Cucurbits of Mediterranean Antiquity: Identification of Taxa from Ancient Images and Descriptions"](#). *Annals of Botany*. **100** (7): 1441–1457. [doi:10.1093/aob/mcm242](#). [PMC 2759226](#). [PMID 17932073](#).
3. [^] Note:
 - o Pliny the Elder with John Bostock and H. T. Riley, trans., *Natural History* (London, England: Henry G. Bohn, 1856), vol. 4, book 19, chapter 23: "Vegetables of a cartilaginous nature – cucumbers. Pepones.", [p. 156](#).
 - o The Roman poet [Martial](#) also briefly mentions greenhouses or cold frames in: *Martial with Walter C. A. Ker, trans., Epigrams* (London: William Heinemann, 1920), vol. 2, book 8 (VIII), no. 14 (XIV), [p. 13](#).
4. [^] [rogue classicism: Roman Greenhouses?](#) Cartilaginum generis extraqueterramestcucumismiravoluptateTiberioprincipiexpetitusNulloquippe non die contigiteipensileseorumhortospromoventibus in solemrotisolitoribusrursusquehibernisdiebus intra speculariummunimentarevocantibu



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