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AUTOMATIC MAINTENANCE OF GREEN HOUSE PARAMETERS USING Lab VIEW

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Abstract- Today there is a continuous declination in the cultivable agricultural land area because of urbanization. As the population growth increases constantly there is a need to produce more natural food vegetables for consumption. Since urbanization is almost unavoidable, it is our duty to provide an alternative way that balances the consumption rate and population growth. GREEN HOUSE is one of the most suitable methods to overcome this problem. A greenhouse (also called a glasshouse) is a building or complex in which plants are grown. These structures range in size from small sheds to industrial-sized buildings. This paper monitors the vital parameters such as light intensity, temperature, humidity, pH, level of CO2 that is necessary for maximum efficient growth of plants. When there is any abnormal change in any of the parameters inside the green house, immediate neutralization is provided to bring the process back to control. The National Instrument's programming language LabVIEW is used. This paper can play a major role by increasing the rate of production of valuable plants.

Keywords: Green house, ATmega8, LM 35, PIR sensor, Gas Sensor, LabVIEW.

I. INTRODUTION

The greenhouse effect is a process by which thermal radiation from a planetary surface is absorbed by atmospheric greenhouse gases, and is re-radiated in all directions. Since part of this re-radiation is back towards the surface and the lower atmosphere, it results in an elevation of the average surface temperature above what it would be in the absence of the gases. By their percentage contribution to the greenhouse effect on Earth the four major gases are

- Water vapour36–70%
- Carbon dioxide 9–26%
- Methane 4–9%
- Ozone 3–7%

The major non-gas contributor to the Earth's greenhouse effect, clouds, also absorbs and emits infrared radiation and thus has an effect on radiation properties of the atmosphere. The existence of the greenhouse effect was argued for by Joseph Fourier in 1824. The argument and the evidence was further strengthened by Claude Pouillet in 1827 and1838, and reasoned from experimental observations by John Tyndall in 1859, and more fully quantified by Svante Arrhenius in 1896.

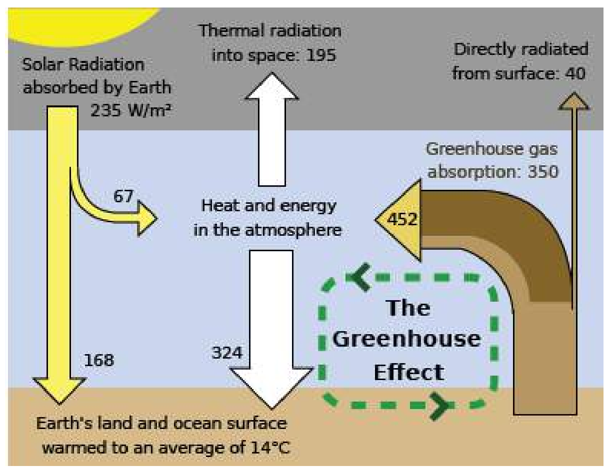

Fig1.1 Representation of Green House effect with their respective intensity values

The paper is organized as follows. Section 2 deals with the proposed system. Section 3 discuss the diagnosis. Section 4 discuss the result and Section 5 concludes the paper.

A. OBJECTIVE

To maintain the important factors for plant growth in an optimum level and in turn increasing the productivity of plants in a season independent manner.

B. GREEN HOUSE

A greenhouse (also called a glasshouse) is a building or complex in which plants are grown. These structures range in size from small sheds to industrial-sized buildings. A miniature greenhouse is known as a cold frame. Commercial glass greenhouses are often high tech production facilities for

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vegetables or flowers. The glass greenhouses are filled with equipment like screening installations, heating, cooling, lighting and also may be automatically controlled by a computer to maximize potential growth. A greenhouse is a structural building with different types of covering materials, such as a glass or plastic roof and frequently glass or plastic walls; it heats up because incoming visible sunshine is absorbed inside the structure. Air warmed by the heat from warmed interior surfaces is retained in the building by the roof and wall; the air that is warmed near the ground is prevented from rising indefinitely and flowing away. This is not the same mechanism as the "greenhouse effect".

III.GREEN HOUSE PARAMETERS

A.TEMPERATURE

Temperature affects the growth and productivity of plants, depending on whether the plant is a warm season or cool season crop.

Photosynthesis – Within limits, rates of photosynthesis and respiration both rise with increasing temperatures. As temperatures reach the upper growing limits for the crop, the rate of food used by respiration may exceed the rate at which food is manufactured by photosynthesis. For tomatoes, growth peaks at 96°F.

Temperature influence on growth – Seeds of cool season crops germinate at 40°F to 80°F. Warm season crop seeds germinate at 50°F to 90°F. In the spring, cool soil temperatures are a limiting factor for plant growth. In mid-summer, hot soil temperatures may prohibit seed germination. Temperature factors that figure into plant growth potentials include the following:

- Maximum daily temperature
- Minimum daily temperature
- Difference between day and night temperatures
- Average daytime temperature

B. HUMIDITY

All plants inhale carbon dioxide through their leaves. This gas is used in photosynthesis. As the plant opens its leaf pores to take in carbon dioxide, some of the moisture in the leaf can escape. Thus the plants sweat water vapour into the air whenever they breathe. Dry air causes plants to transpire moisture much more rapidly than does humid air. Water in the leaves evaporates very quickly into air, causing the plant to lose moisture at a rapid rate. When leaves begin to lose water faster than the roots can absorb it - disaster strikes. It is an evil the plant inflicts on itself, in self defence. In order not to lose more water to the air, the plant will almost completely close its leaf pores. This slows down the flow of moisture from the plant effectively, but unfortunately it also reduces the intake of carbon dioxide. Without supplies of carbon dioxide, the cells begin to die and the plant looks tired and ill.

The important point to remember is that dry air pulls water out of the leaves faster than the roots can supply the leaves. Under these conditions, it doesn't matter how much you water such a plant it doesn't help. Over watering only reduces the amount of air in the soil and invites root rot.

When plants have the right humidity they thrive, because they open their pores completely and so breathe deeply without threat of excessive water loss. When the air is moist, there is little water lost from the leaf. Damping down the benches and surrounds, also misting leaves will keep the air moist. Rapid temperature rises damage orchids too. It means that the plants leaves become warm and physiologically active, while the root system in its solid rooting medium, is still cold and consequently Physiologically dormant. The active leaves are demanding large quantities of water and nutrients which the root system cannot possibly supply.

C. SOIL MOISTURE

Soil moisture levels should determine timing of irrigation and the soil moisture can be estimated by feel and appearance of the soil. The tensiometers or resistance blocks also may be used to estimate soil moisture. Check moisture in at least one location for each area of the field that differs from other areas in soil texture and slope.

D. LIGHT INTENSITY

Light intensity is measured in foot-candles, defined as the strength of light given off by one candle at a distance of 1 foot. Light intensity is the single most important factor in photosynthesis. Low-light intensity may not kill a plant, but will result in leggy, weak growth, and plants that don't flower or produce fruits. Outdoors on a sunny day, the light intensity measures approximately 10,000 foot-candles. A typical sunny living room may only have about 3,500 foot-candles.

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Different kinds of plant lights give off different colours and intensities of light. There are three characteristics of light to consider when deciding which type of bulb to
Use

- Colour
- Intensity
- Duration.

The sun emits light in all colours of the visible spectrum, but light in the blue and red ranges is most important for plant growth. All flowering plants require large amounts of orange/red light in order to bloom, and blue light promotes lush, compact foliage growth. Duration refers to the number of hours of light per day. Because artificial plant lights don't exactly duplicate the intensity of sunlight, we compensate by giving plants more hours of artificial light than they would receive in their native habitats. Increased quantity compensates for reduced quality. Light is a form of energy, which means it has heat, and some plant lights are hotter than others.

High-intensity discharge (HID) lights emit the most heat. Depending on the wattage, HID bulbs should be positioned 2 to 6 feet above plant foliage. Keep them any closer and they could burn plant leaves.

High-output fluorescent bulbs aren't as hot and can be 2 to 4 feet above plants.

Traditional fluorescent tubes are the coolest and can be placed 6 inches from foliage without burning plant tissue.

III. PROPOSED SYSTEM

A. ATmega8

The ATmega8 is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8 achieves throughputs approaching 1 MIPS per MHz, allowing the system designer to optimize power consumption versus processing speed.

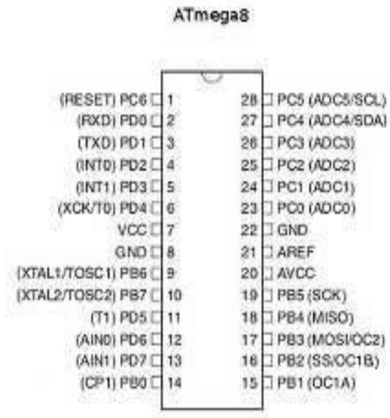

Fig: 3.1 PIN configuration of ATmega8

B. SENSORS USED

LM 35 (TEMPERATURE SENSOR)

It is commonly used as a temperature measurement sensors. It includes thermocouples, platinum resistance, thermal resistance and temperature semiconductor chips, which commonly used in high temperature measurement thermocouples. Platinum resistance temperature used in the measurement of 800 degrees Celsius, while the thermal resistance and semiconductor temperature sensor suitable for measuring the temperature of 100-200 degrees or below, in which the application of a simple semiconductor temperature sensor has good linearity and high sensitivity. The LM35 linear temperature sensor and sensor-specific expansion of Arduino board, in combination, can be very easy to achieve. The LM35 linear temperature sensor pin definitions: (1) Output (2) complex (3) power.

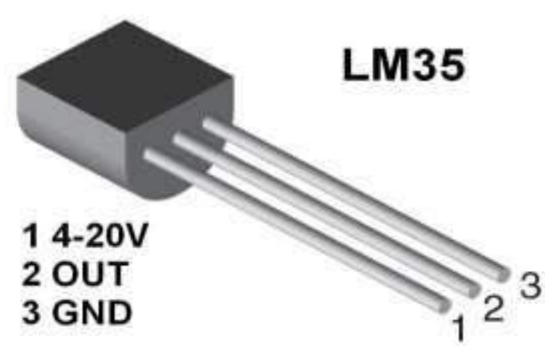

Fig: 3.2 LM 35 Temperature sensor PIN configuration

The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor.

It also possess low self heating and does not cause more than 0.1 oC temperature rise in still air. The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in response to every oC rise/fall in ambient temperature,i.e., its scale factor is 0.01V/ oC.

It is a instructable to waterproof a LM35 for use on a tethered ROV using a automobile 12V battery as a power source. This came out of a need for the MATE ROV Competition. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.

PIR MOTION DETECTOR MODULE

Fig : 3.3PIR sensor

Used a motion detector IC and PCB mounted Fresnel lens and it is used for detecting humans with its high sensitivity.

TECHNICAL SPECIFICATION

- Supply current DC 5V-20V
- Voltage Output 3.3V
- Delay Time 5s to 18m
- Operation Temperature -15° centigrade to 70° centigrade
- Infrared Sensor low noise, high sensitivity

GAS SENSOR

The Gas sensor has good sensitivity and selectivity of co2 with low humidity and temperature dependence. It has long stability.

The gas sensor module consists of a steel exoskeleton under which a sensing element is housed. This sensing element is subjected to current through connecting leads. This current is known as heating current through it, the gases coming close to the sensing element get ionized and are absorbed by the sensing element. This changes the resistance of the sensing element which alters the value of the current going out of it.

Fig 3.4 GAS sensor

LIGHT SENSOR

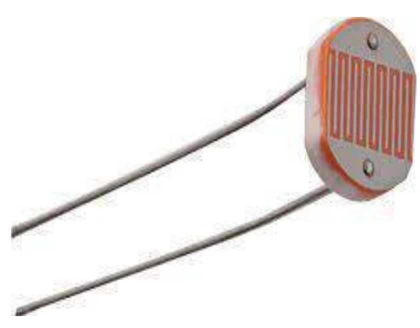

Fig 3.5 LDR

Two cadmium sulphide (cds) photoconductive cells with spectral responses similar to that of the human eye. The cell resistance falls with increasing light intensity. systems.IV. RESULTS

A.LabVIEW

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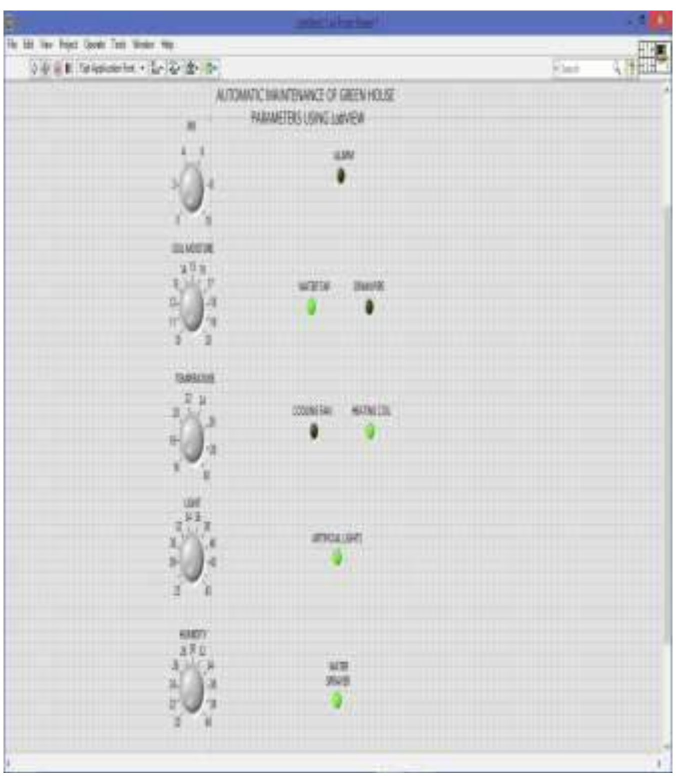
LabVIEW is a highly productive development environment for creating custom applications that interact with real-world data or signals in fields such as science and engineering. The net result of using a tool such as LabVIEW is that higher quality projects can be completed in less time with fewer people involved. So productivity is the key benefit, but that is a broad and general statement. To understand what this really means, consider the reasons that have attracted engineers and scientists to the product since 1986.

LabVIEW includes extensive support for interfacing to devices, instruments, cameras, and other devices. Users interface to hardware by either writing direct bus commands (USB, GPIB, Serial) or using high-level, device-specific, drivers that provide native LabVIEW function nodes for controlling the device.LabVIEW includes built-in support for NI hardware platforms such as Compact DAQ and Compact RIO, with a large number of device-specific blocks for such hardware, the Measurement and Automation eXplorer (MAX) and Virtual Instrument Software Architecture (VISA) toolsets.National Instruments makes thousands of device drivers available for download on the NI Instrument Driver Network

B. Complete Simulation



can increase the productivity of the crops by the continuous monitoring and controlling of the necessary parameters such as light, moisture, humidity, CO2, pH and temperature. Therefore by providing the optimum conditions for the growth of the plants, the yield will also be correspondingly increased. The vital parameters will be completely monitored thereby allowing very less immature crops

V. CONCLUSION

This paper can be employed any number of times in the same green house and can be controlled by ATmega 8 controller. Many varieties of plants are prone to damage from insects. A greenhouse keeps plants in isolation, locked safely away from the outside world where insects, rodents and other animals could damage crops. Plants grown in a greenhouse, however, are protected from blizzards, dust storms, and high winds. In addition, greenhouse plants aren’t at the mercy of soil erosion due to torrential rain or flash floods. This gives gardeners the comfort of knowing that they don’t have to race home from work to cover their gardens or simply hope that their plants survive during periods of inclement weather. They can be employed in places where there is more demand for vital plants but only a small cultivation land is present.

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