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# Green Houses Ideal Energy Management

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## ABSTRACT

India's economy depends heavily on agricultural products. In India, agriculture is the primary industry. In this situation, improving India's food production technology is crucial. However, the isotropic climate conditions restrict the agricultural output due to lack of water reservoirs, wind, and intense solar radiation. The goal of agriculture also wastes a lot of water and energy. In the USA, greenhouse and poultry versions conserve 16% of the energy. The key duty in India is to reduce greenhouse energy consumption and increase crop production quality.

IN GREENHOUSES, WHICH RESEMBLE BUILDINGS OR COMPLEXES, PLANTS ARE GROWN. THIS STRUCTURE COMES IN BOTH SMALL AND LARGE SIZES. COMPARED TO AN OPEN-AIR IRRIGATION REPRODUCTION SYSTEM, THE RELATIVELY CONTAINED ENVIRONMENT OF A GREENHOUSE HAS ITS OWN UNIQUE TYPE OF MANAGEMENT REQUIREMENTS. IN A GREENHOUSE, CONTROLLING THE ARTIFICIAL MICROENVIRONMENT IS CRUCIAL FOR HAVING DESIRABLE PRODUCTION.

## I.INTRODUCTION

In greenhouses, which resemble buildings or complexes, plants are grown. This structure comes in both small and large sizes. Compared to an open-air irrigation reproduction system, the relatively contained environment of a greenhouse has its own unique type of management requirements. In a greenhouse, controlling the artificial microenvironment is crucial for having desirable production. By managing the primary physical factors temperature, humidity, fogging system, etc. As well as the elements that affect how quickly plants grow-nutrients, sunlight, water, carbon dioxide, artificial light, etc.

It is possible to optimise the plant's energy and water usage as well as the quality of its produce. A multitude of sensors are used by the arm controller to collect data about greenhouse environment conditions, which is then transferred to and from a personal computer. In accordance with the required condition of the crops, it alters the state of greenhouse control equipment such as heaters, fans, bulbs, fogging systems, etc. The suggested model is intended to regulate the greenhouse and save energy costs while upholding the necessary operational restrictions. India's economy depends heavily on agricultural products. In India, agriculture is the primary industry. In this situation, improving India's food production technology is crucial. However, the isotropic climate conditions restrict the agricultural output due to lack of water reservoirs, wind, and intense solar radiation.

A lot of water and energy are also squandered in agriculture. The key duty in India is to reduce greenhouse energy consumption and increase crop production quality. In greenhouses, which resemble

buildings or complexes, plants are grown. Compared to an open-air irrigation reproduction system, the relatively contained environment of a greenhouse has its own unique type of management requirements. In order to maintain a greenhouse system, it is necessary to control pests and illnesses as well as extremes of heat and moisture.

In a greenhouse, controlling the synthetic microenvironment is crucial for optimal productivity. by regulating the primary physical factors, such as the moisture sensor, light, and CO2. The plant's production quality, the energy and water consumption, as well as the factors affecting the pace of growth of the plant, such as nutrients, sunlight, water, CO2, artificial light, etc., may all be maximised by employing greenhouses.

## II. EXISTING METHOD

SEMIAUTOMATIC NURSERY WITH OPEN-AIR IRRIGATION SYSTEMS.

### DRAW BACKS:

IT CALLS FOR A LOT OF LABOUR.

ENERGIES WASTE.

INFECTIONS AND BUGS ARE FAIRLY PREVALENT.

## III. PROPOSED METHOD

THE QUALITY OF THE PLANT'S OUTPUT AND THE AMOUNT OF ENERGY AND WATER USED CAN BE MAXIMISED BY CONTROLLING THE PRIMARY PHYSICAL VARIABLES, SUCH AS TEMPERATURE, HUMIDITY, WATER SYSTEM, ETC., AS WELL AS THE FACTORS AFFECTING THE RATE OF PLANT GROWTH, SUCH AS WATER, CO2, ARTIFICIAL LIGHT, ETC. A MULTITUDE OF SENSORS ARE USED BY THE ARM CONTROLLER TO COLLECT DATA ABOUT GREENHOUSE ENVIRONMENT CONDITIONS, WHICH IS THEN TRANSFERRED TO AND FROM A PERSONAL COMPUTER. THE CONDITION OF GREENHOUSE CONTROL DEVICES, SUCH AS HEATERS, FANS, BULBS, FOGGING SYSTEMS, ETC., IS CONSEQUENTLY ALTERED. IN ACCORDANCE WITH THE CROPS' REQUIREMENTS. THE SUGGESTED MODEL IS INTENDED TO REGULATE THE GREENHOUSE AND SAVE ENERGY COSTS WHILE UPHOLDING THE NECESSARY OPERATIONAL RESTRICTIONS.

### ADVANTAGES:

A GREENHOUSE CAN OFFER A GREAT CONTROLLED ENVIRONMENT FOR THE GROWTH OF PLANTS.

IT DELIVERS CONSISTENT WATER HEATING, LIGHTING, AND WARMTH.

WATER AND ENERGY EFFICIENCY.

CONTROLLING PESTS, DISEASES, AND SEVERE HEAT AND HUMIDITY IS NECESSARY.

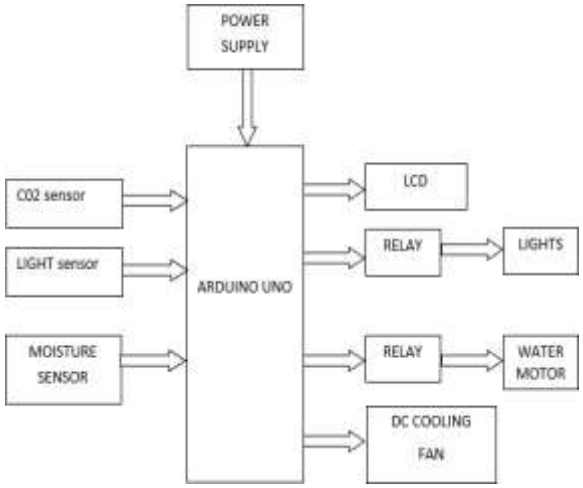



Fig 1: Block Diagram

**IV. MODULE DESCRIPTION:**

**a.ARDUINO UNO:**

The company's ATmega328P microcontroller is the basis for the open-source Arduino Uno microcontroller card. The card has advanced and basic info/yield (I/O) pin groups that can be connected to a variety of development cards (safeguard) and circuits. 14 advanced I/O pins are present (six with PWM yield work).The Arduino IDE (Integrated Development Environment) can be used to modify the six straightforward I/O sticks via a USB Type B connector. Despite the fact that it can accept voltages between 7 and 20 volts, it can be powered by a USB link or an external 9-volt battery. It is comparable to Leonardo and Arduino Nano. The same Creative Commons Attribution 2.5 licence has been applied to the equipment reference configuration.

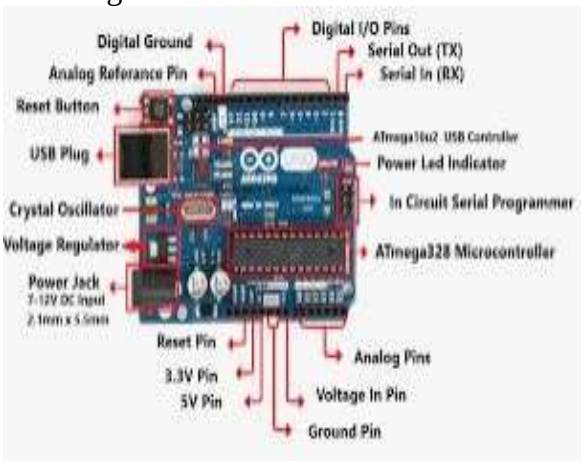



Fig 2: Hardware component Aurdinouno

**b.SOIL MOISTURE SENSOR:**

One type of sensor used to measure the volumetric substance of water in the soil is the soil moisture sensor. The soil moisture direct gravimetric component needs to be killed, dried, and tested

weighted. These sensors use a variety of soil guidelines, including dielectric constant, electrical obstruction, collaboration with neutrons, and substitution of the moisture content, to measure the volumetric water content indirectly.

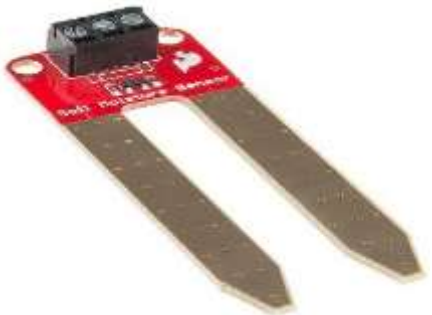
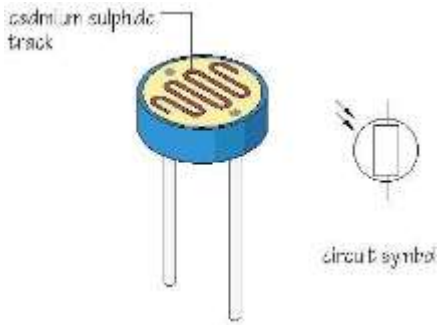


Fig 3: Soil Moisture sensor

**c.LDR**

Other names for an LDR, also referred to as a photo resistor, photocell, or photoconductor. It is a particular kind of resistor, and the resistance changes according to the amount of light that hits its surface. The resistance alters when light strikes the resistor. In many circuits where the need to detect the presence of light exists, these resistors are frequently used. The resistance and uses of these resistors




are varied. For instance, the LDR can be used to turn ON a light when it is in the dark or to turn OFF a light when it is in the light. A typical light-dependent resistor has a resistance of 1 MOhm in complete darkness and a resistance of a few K Ohms in complete brightness.

Fig 4:Light Dependent resistor

**d.MQ-135 Gas sensors:**

The MQ-135 Gas Sensors are utilised in air quality control systems and are ideal for NH3, NOx, Alcohol, Benzene, Smoke, and CO2 detection or measurement. The MQ-135 sensor module has a Digital Pin that enables it to function without a microcontroller, which is useful if you're simply looking to detect one specific gas. Analog pins must be utilised if you need to monitor gases in PPM. The analogue pin may be utilised with the majority of popular microcontrollers because it is TTL driven and operates on 5V.

Fig 5:MQ135 Sensor

V. RESULTS

Fig 6:Hardware implementation



**Fig :LCD Display**

Fig 7:Displaying light condition

## VI. CONCLUSION:

THE LDR SENSOR (LIGHT SENSOR), MQ-135 SENSOR (CARBON DIOXIDE SENSOR), AND SOIL SENSOR, RESPECTIVELY, MEASURE THE MANY CHARACTERISTICS THAT ARE PRESENT IN THE PLANNED GREENHOUSE ENVIRONMENT, SUCH AS LIGHT POWER, CO2 FOCUS, AND MOISTURE CONTENT IN THE SOIL. BULB WILL BE ACTIVATED WHEN GREENHOUSE ARTIFICIAL LIGHTING SYSTEM LIGHT INTENSITY IS LOW. COOLING FANS TURN ON WHEN THE GREENHOUSE'S CO2 CONTENT IS HIGH. THE WATER PUMP MOTOR WILL TURN ON WHEN THE SOIL'S MOISTURE CONTENT IS LOW. THESE CHARACTERISTICS ARE AUTOMATICALLY TRACKED AND MANAGED BY THE MICROCONTROLLER. THE OUTCOMES WILL BE SEEN ON THE COMPUTER'S SCREEN. THIS GREENHOUSE OFFERS CHEAP PRODUCTION COSTS, SUPERIOR PRODUCT QUALITY, WATER AND ENERGY SAVINGS, MORE THAN ONE CROP PER YEAR, AND REDUCED LABOUR REQUIREMENTS.

THIS GREENHOUSE OFFERS A GREAT, REGULATED ENVIRONMENT FOR GROWING PLANTS.

FOR THE BEST OPERATION OF GREENHOUSES, A HIERARCHICAL CONTROL STRATEGY WAS SUGGESTED. THIS STRATEGY CONTAINS BRAND-NEW MATHEMATICAL MODELS FOR THE BEST OPERATION SCHEDULING OF GREENHOUSE ELECTRICAL, GAS, AND HEATING SYSTEMS. IN ORDER TO MANAGE SUPPLEMENTAL LIGHTING, CO2 GENERATION, AIR CIRCULATION AND VENTILATION, AND HEATING AND COOLING SYSTEMS IN CURRENT GREENHOUSES CONTROL SYSTEMS, OPTIMIZATION MODELS WERE SUBSEQUENTLY DEVELOPED.

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