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Smart Green House for Home Farming

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***Abstract* – Today, human needs a revolution for growing vegetables because, some farmers uses medicines for growing vegetables. The medicines are very harmful to the human body. This paper provides an initiative to make smart greenhouse so the human can grow vegetables in own house. The smart greenhouse is a technique used for growing vegetables automatically, rapidly and gets organic vegetables. In smart greenhouse, temperature & humidity is automatically maintained. And we can implement the smart irrigation system. The smart irrigation system is a technique that provides automatic irrigation.**

Keywords*:- *Temperature control, humidity control, Smart irrigation system , Soil Moisture, measurement, Instrumentation, Control

I. INTRODUCTION

The concept of the precision smart greenhouse has been around for some time now. Smart greenhouse can be defined as a comprehensive system designed to optimize vegetable production by carefully tailoring soil and crop management to correspond to the unique condition found in each field while maintaining environmental quality, economy, and yields. Literature available and research by people has grown very much during the last decade in this area.

The smart greenhouse is one of these applications with promising potentials in health and the environment. The smart greenhouse is a crucial source for life and any living creature needs it to hydrate every cell. Long term and frequent droughts and competing water demands in most parts of the world have caused severe pressure on water resources. In addition, the high cost of irrigation worldwide is the main problem in agriculture development. Therefore, developing new techniques for water consumption reduction has drawn the research interest of scientists worldwide. The following sections covers three Part 1.Smart Green House, 2. Control Unit, 3.Irrigation System.

II.SMART GREEN HOUSE

Smart Greenhouse is a self-regulating, micro-climate controlled environment for optimal plant growth. It is made by using acrylic sheet. Clamp and screw is used to joint acrylic sheet. For growing vegetables in Smart Greenhouse We have measured and control different types of parameters like temperature, humidity, and moisture of soil. After controlling these kind of parameter climate is automatically controlled. Because of automatic control of parameter growth of plant is rapid.

Sensor sense the parameter and signal gives to the controller and controller control the parameter according to requirement. Requirement is dependent on season like winter, summer, and monsoon. In winter season, outer temperature is low and inner temperature high so plant get comfortable environment, In summer season outer temperature is high and Inner temperature low So plant get comfort environment, In monsoon season outer temperature is according to weather and inner temperature is according to weather So plant get comfort environment. Also, humidity control is an additional feature which is taken care of for better growth of plant.

[1]Green House

In Smart Greenhouse, irrigation is very important part because growth of plant is dependent on irrigation. In this system, irrigation is automatic. Soil moisture sensor senses the moisture of the soil and sends it to the controller and according to the level of moisture in the soil, the controller decides that position of valve should be open or closed

III.CONTROL UNIT

In the control unit, there are two main stages:

1. Data acquisition.
2. Data analysis & Controlling.

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TEMPERATURE & HUMIDITY.

Temperature is defined as measurement of hotness or coldness of any substance. Humidity is defined as the amount of water vapour present in air. For Temperature and Humidity measurement we have used one digital sensor for both parameter.

A) DHT11-

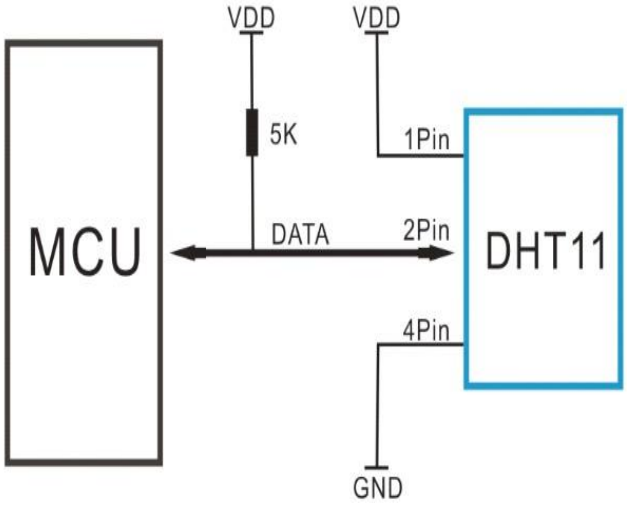
DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity-sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability, and cost-effectiveness.

[2]DHT11 Sensor

The DHT11 element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The calibration coefficients are stored as programs in the memory, which are used by the sensor's internal signal detecting process. The single-wire serial interface makes system integration quick and easy. Its small size, low power consumption and up-to-20 meter signal transmission makes it the best choice for various applications, including those most demanding ones. The component is a 4-pin single row pin package. It is convenient to connect and special packages can be provided according to the user's request.

1.DATA ACQUISITION FROM DHT11:-

We have Measure temperature And Humidity of Green House Using DHT-11 Sensor. DHT-11 specifically designed for measuring Temp. And Humidity Both.



[3]Interfacing MCU with DHT11 Sensor

2. Controlling Of Temperature and Humidity Using DHT11.

Temperature and humidity sensor is placed inside the smart greenhouse to measure humidity and temperature. When the temperature rises above a certain level, micro-controller will trigger relay attached to the fogger, which will sprinkle tiny water droplets of the size of a micron which will remain suspended in the air and bring the temperature down. In case the air moisture falls below the set value, a similar mechanism will be triggered and the small water droplets will maintain the relative humidity (RH). In case the relative humidity is at threshold and further cooling is required, Peltier module is used which can be powered by solar panels and can regulate the temperature by cooling or heating as per the requirements. Glass greenhouse structure can hold the heat during night time that prevents the leaves from frostbite in cold winter night in some cold and dry areas.

LEVEL OF WATER TANK

The level is defined as a horizontal plane or line with respect to the distance above or below a given point.
For water level measurement, ultrasonic sensor is used.
Level of water tank is measured by HC-SR04 and that
Water is use for irrigation of plant.

A) HC-SR04 (ULTRASONIC SENSOR):-

The ultrasonic sensor is defined as a transducer that converts electrical energy into sound waves and vice versa. These sound waves fall above the normal range of human hearing and hence it is known as ultrasonic waves. These types of waves are above the frequency of about 18000 Hz.

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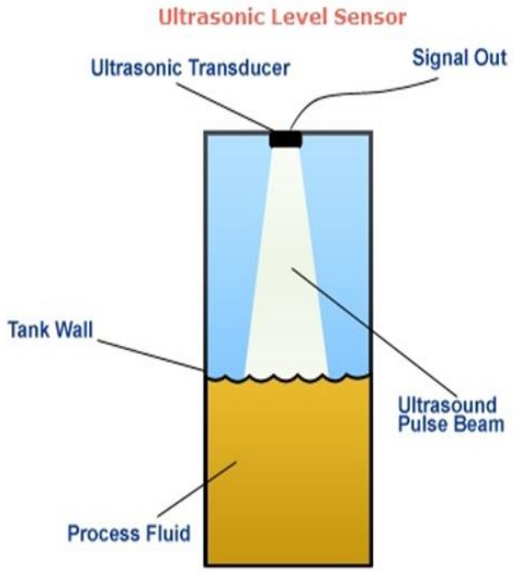
[4]Ultrasonic Sensor

There are two main parts in the sensor viz. transmitter and receiver. The transmitter part converts electrical energy into sound and transmits it. The receiver part receives the echo and turn this received sound waves into electrical energy. This returned echo is measured and used for distance calculation by the ultrasonic sensor. Basically this sensor calculates time interval between signal transmission and reception of echo and determines the distance of the object from the sensor. As this sensor is used for distance measurement it is known as distance sensor. Piezoelectric crystals are used in the ultrasonic sensor construction due to the fact that these crystals oscillate at higher range of frequencies. Irrigation is the artificial application of water to the soil through various systems of tubes, pumps, and sprays. Irrigation is usually used in areas where rainfall is irregular or dry times or drought is expected. Their

1.DATA ACQUISITION FROM ULTRASONIC LEVEL MEASUREMENT

The level sensor is located at the top of the tank in such a way that it sends out the sound waves in the form of bursts in downward direction to the fluid in the tank under level measurement. As soon as the directed sound waves hits the surface of the fluid, sound echoes gets reflected and returned to the sensor.

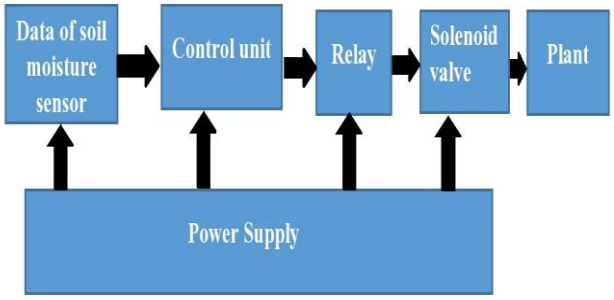


[5]Measurement of Level using ultrasonic sensor

The time taken by the sound wave to return is directly proportional to the distance between the piezo electric sensor and the material in the tank. This time duration is measured by the sensor which is then further used to calculate the level of liquid in the tank. The speed of the sound waves can sometimes be affected due to variations in temperature for which appropriate compensations need to be provided in the sensor design. In general, the medium over the fluid's surface is air. However, one can employ a blanket of nitrogen or any other vapour also.

IV. SMART IRRIGATION SYSTEM

Smart irrigation systems offer convenience while protecting your landscape investment. A well-maintained system keeps your lawn and landscape beautiful and healthy, while minimizing water waste. is a two method of irrigation system.



[6]Smart irrigation system

There are two method of irrigation system.

1) Time based irrigation system
2) Sensor based irrigation system

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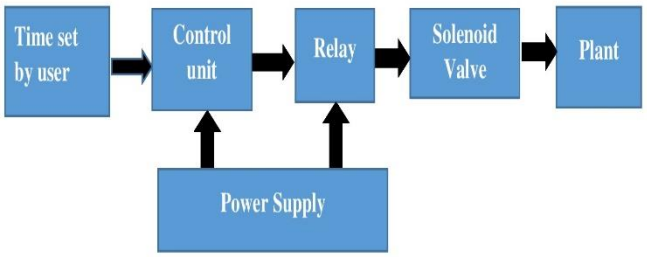
1)TIME BASED IRRIGATION SYSTEM:-

In the time-based irrigation system, humen set the specific time in the controller. According to water requriement of plant human can set the timeing periode of watering.

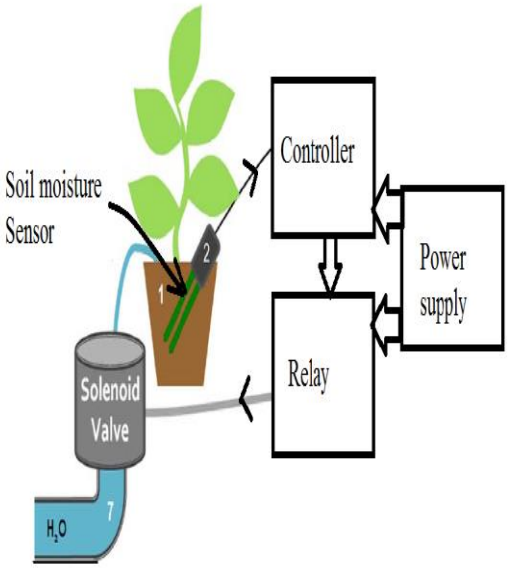


[7] Time based irrigation system

Assume that plant required water once in a day so humen can set that timeing in control unit. Suppose human can set irrigation to plant at a 12pm.control unit and relay the required supply for there operations. When 12 pm occurs then the control unit gives the signal to relay so relay is trigger. Relay become normally open to close therefore the solenoid valve is energized. When the solenoid valve is energized so the plant gets water for some time. That time is set by the user. Users can set the time according to season. Plants get the water when human is present or absent means it is an automatic system that gives water automatically to plant.

2)SENSOR BASED IRRIGATION SYSTEM:-

A sensor based irrigation system is used for efficient water management. In a sensor base irrigation system, automatic watering give to the plant. That requriremenrt of plant is sensed by soil moisture sensor. when water conatine of plant is low at that time soil mosisure sensor send the signal to conroller and controller trigger the relay therefore valve is open and plant gets watering. When water of plant is high at that time soil mosisure sensor send the signal to conroller and controller trigger the relay therefore valve is close so water flow is stop. Using sensor, plant get proper amount of water so water is not more wasted.



[8] Sensor based irrigation system

When soil moisture level is The controller gives the signal to relay .it will trigger normally close to open which is turn off solenoid valve and stop watering to plant.

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