



IOT Based Greenhouse and Solar Monitoring System

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ABSTRACT

This paper is about developing Greenhouses with the help of new technology using iot and solar powered devices Greenhouses are climate-controlled facilities with specifically built walls and roofs for growing plants in the offseason. Most greenhouse systems are operated manually systems for temperature and humidity monitoring This might be inconvenient for the worker because they are on their feet. Every day, I'm obligated to personally visit the greenhouse They are under your command. Furthermore, a slew of issues might arise because of it. Because of the temperature and humidity, it has an impact on the manufacturing rate. To guarantee the best results, humidity levels must be evaluated on a regular basis. The plants provide a decent yield. IoT is one of the newest technologies. Information and Communication Technology's Most Recent Advances Technologies that enable global connectivity and collaboration Sensors, devices, and people with information are all managed. As a result, the marriage of IoT with embedded technology has resulted in aided in the development of answers to many of the existing problems over time, practical issues have arisen all greenhouses have solar power. But since the invention and popularity of solar panels using photovoltaic cells, the earth has begun to distinguish between passive solar design and solar powered electric (photovoltaic or PV) design Solar design refers to the use of precise construction principles that increase energy gain and reduce heat loss. A solar-powered PV greenhouse generates electricity to power electrical appliances in a greenhouse-like fan, pumps, and lamps

KEYWORD: -solar energy, IOT smart system, etc

1. INTRODUCTION

A greenhouse is a closed building that is used to grow plants is used to give protected area to plants from external conditions such as Climate change, pollution, and other factors it provides a long-term solution as well as the effective growth of the plants across the year. Sunlight is one of the most important variables influencing plant

development Soil moisture content, temperatures, humidity's, and so on Numerous researchers have experimented with water spraying as well as an irrigation system The physical requirements are as follows in this research, we present a system that takes three parameters with sensors and activate actuator if the actual values exceed the threshold value.

These settings are likewise saved in the cloud database, allowing they may be viewed at any time and from any location. This research article also sheds information on the automated climate control inside green-house conditions there are several seasonal foods that can only be cultivated under conditions. Winter vegetables include onions, garlic, and shallots, among others. Crops that require chill temperatures to grow. Summer crops include cucumbers, melons, and other fruits and vegetables. Necessitate moderate to hot climatic conditions. We used moisture sensors, temperature and humidity sensors, a Raspberry PI, and water pipes to deliver water from a tank controlled by DC motors in our prototype A solar-powered PV greenhouse produces electricity to power electric equipment in the greenhouse-like fans, pumps, and lights Directing the sun.

2. METHODOLOGY

We have a system in place to maintain a consistent climate inside green-house and to keep the soil at an acceptable moisture level created a temperature control and watering system that is automated Temperature and humidity are monitored by the system Measuring the moisture content of the soil based on temperature and humidity moisture sensor DHT11 & YL69. The green-house interior is separated into numerous zones .Each part is dived into section, each section one moisture sensor in each segment. GPIO pins 2, 3, and 4 receive the output of these moisture sensors. Raspberry Pi (Raspberry Pi) The driver IC receives the output from PI. This, in turn, turns on or off the motor. Spinach was chosen as the experimental plant. Humidity of the soil - 50% 14 percent relative humidity in the air 250 degrees Fahrenheit greenhouse generates electricity to power electrical appliances in greenhouse-like fan, pumps, and lights Directing the sun.

3. MODELING AND ANALYSIS

Currently, billions of (IoT) internet of thing devices, such as sensor and RFIDs, are appearing several areas,

delivering not just computation heavy, but also data-intensive services. Includes time-sensitive services, such as augmented/virtual reality dispersed data analysis and artificial intelligence reality. The (IOT) is a concept in which each gadget is connected to the internet. Anyone with an IP address may access your computer. This allows that device to be identified on the internet. Nowadays The internet is a constantly changing phenomenon that began as the internet of the future. computers. The most important components of an IoT-based greenhouse Raspberry PI, Relay as a Monitoring and Automation System Along with their driver circuits, they swap. This eliminates the presence of humans. It enables human-machine interaction and makes it technically viable. by substituting it in a variety of home operations electronic systems that have been programmed in the end, it's all about the system. that aspires to improve people's good quality of life through automations Appliances that can be accessed through the internet as an orientation, separation is very important in the solar greenhouse because it all reduces any wasted energy.

For maximum protection, the north wall of your heating room should be made of heat-resistant materials such as concrete or stone painted in black. This will help maintain heat. Additionally, paint the east and west walls neatly with a simple object such as clear vinyl sheeting (so that the sun's rays can penetrate) or fancier reflective sheeting want to insulate the underground again. This is even more difficult and expensive but totally worth it! By installing space under your greenhouse - not just the greenhouse floor itself, but the entire building area - you will not only prevent heat loss from the floor, but also create a large energy store under the greenhouse

i. Raspberry/Pi(3)

The Raspberry/PI (3), a one board computer with SOC, is at the heart of our project. Acts as a low-cost desktop, using the Arm processor as its heart. Processor. It has 40 GPIO pins, a CPU, and other features. 1.2GHz processor, 1 GB RAM memory, and built-in Wi-Fi. The Raspberry/PI (3) will be the same price as its predecessor. Predecessor, but with the addition of Bluetooth functionality and (Wi-Fi). The new model comes with built-in Wi-Fi networking. The Raspberry/PI (3) is obviously positioned as a low-cost Internet

hub. IoT devices, or a flexible, low-cost base on emerging technologies Different sorts of linked devices. We used a PC to run the PI. Noob's OS must be installed on the SD card. Python The putty software, which is placed on the computer, is used to programmed. So, to run the programmed on the Windows platform



Figure 1: Raspberry pi 3

ii. Moisture, Sensors (YL69)

YL69 is a low-cost soil, moisture sensor that detects how much moisture is present in the soil. The operational voltage ranges from 3.3 to 5 volts, with a current of 35 milliamperes when two electrodes come into contact, the sensor is activated. The voltage swings with the soil, i.e-output voltage. there is moisture present, the output voltage drops. when the soil is dry increases

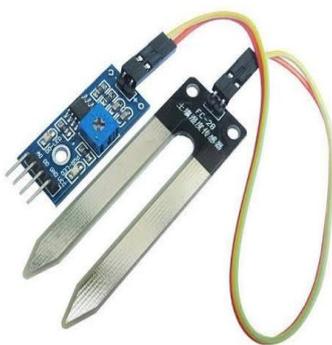


Figure2: Moisture Sensor(YL69)

iii. Humidity&Temperature/ Sensor (Dht11)

DHT11 is a simple, low-cost digital/sensor that can monitor temperature and humidity. It is powered by a voltage. With a voltage range of 3to5 volts and a maximum current of 2.5 mArange

of temperatures the temperature ranges from 0 to 50 degrees Celsius and humidity % the percentage ranges from 20%-to-80%. It is made up of a thermostat. Uses the NTC (Negative Temperature Coefficient) and ato detect, moisture in the air, a humidity sensor component is used



Figure 3: Temperature and Humidity Sensor (DHT11)

iv. Coolers And Sliding windows

Coolers & sliding windows installed on side walls of greenhouse to maintain temperature and to regulate the airflow within the green-house greenhouse needs to breathe! Ventilation is important for the health of plants, cooling your greenhouse, preventing congestion, and reducing pests and diseases. The most sustainable natural ventilation system is a combination of low piping and high piping. However, in a solar panel, you can use one of those gases to power electric fans

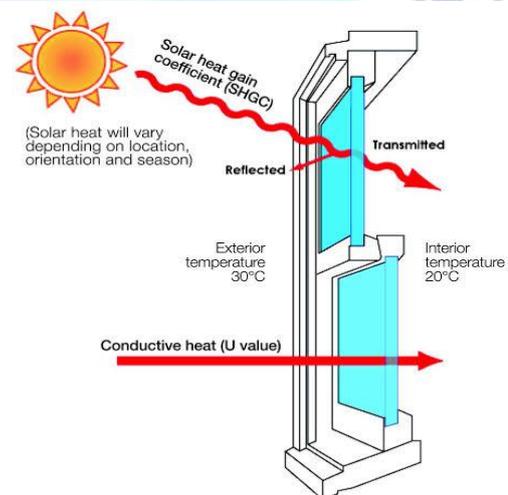


Figure 4: Sliding Windows



Figure 5: Cooling Fan

v. Motor Driver Ic (L293d)

L293D a 16pin motor-driver (IC) has the ability to run 2 Direct Current motors on both directions concurrently Direct Current motors cannot running directly without use of a driver (IC) hence(L293D) crucially assists the motor to run.

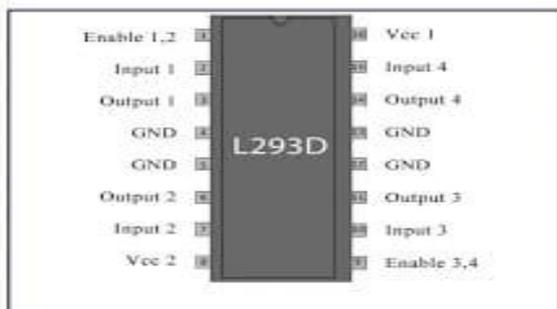


Figure 6: Motor Driver IC (l293d) Pin Description

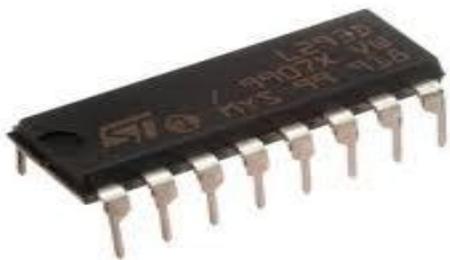


Figure 7: Motor Driver IC (l293d)

vi. Thermal Mass In Greenhouses

Thermal mass is the process of storing heat energy in certain objects within a greenhouse. The most used are water, stone, concrete, and cob. Installing a thermal mass can be as simple as placing water drums in your greenhouse. It is an important practice for all greenhouses, but it is especially important in solar-storage areas

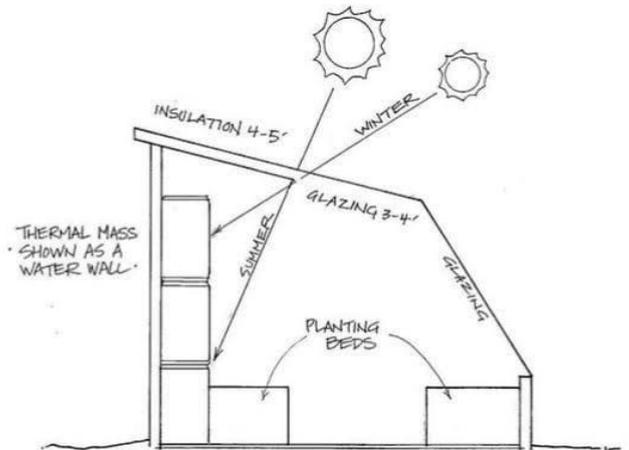


Figure 8: Thermal Mass in Greenhouse

vii. Solar Panels For Greenhouses

Solar panels convert solar energy into electrical energy in their photovoltaic (PV) cells. They work on sunny and cloudy days



Figure 8:Solar Panels for Greenhouse

It's simple enough but with greenhouse renovations, there are a few more details to consider Installation of the Solar Panel Placement for Greenhouses placing something large, indistinct on sun-loving greenhouse is not the wisest thing to do place solar panels somewhere outside the top of greenhouse: maybe next to it, or even over your house greenhouse needs to be large enough to hold enough panels for Solar Panel Batteries for Greenhouses Solar storage systems can not only provide a quick backup power switch but also allow your solar

panels, to continue operating during shutdown, provide extra power and battery charge whenever the sun is out. There are many chemical compounds ranging from lead-acid to glass-absorbing mats to lithium. There are advantages to each, but lithium durability has made it popular as a domain, especially because of the number of cycles (charges and releases) you can get from this product. Cycling to get lithium makes it easy to control from the app and keeps you simple with little or no adjustment at all. There are three different ways you can use your Home Energy Storage Solution, and it is important to understand the difference so that you can understand how it can make sense to you

4. RESULTS AND DISCUSSION

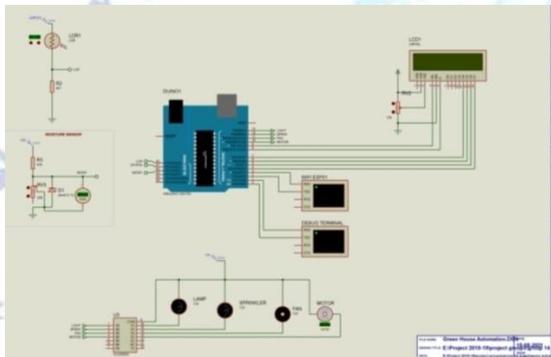


Figure 8: Circuit Diagram

In this work we must improve the efficiency and effectiveness of the system, the system is improving because of following the proposal, a water quality control method can be provided to the farmer. So, we can turn on / off the pump to start / stop the irrigation process outside the farm. The farmer also chooses to stop the growth of the crop, or the crop may be damaged due to problems situation. In the above cases the farmer may set up the system remotely.

Case 1: morning

Sr.no	Parameter	Reading
1	Temperature	28.60
2	Humidity	81.00
3	Soil moisture	60
4	Water level	0

Table: 1

Case 2: Night

Sr.no	Parameter	Reading
1	Temperature	30.00
2	Humidity	68.00
3	Soil moisture	45
4	Water level	1

Table: 2

5. CONCLUSION

The greenhouse management and watching system is supposed to produce healthier crops with inflated yields in minimum-to-minimum time. This project is incredibly helpful for small scale farmers and for hobbyists. We can simply grow plants in an exceedingly greenhouse because of we tend to don't got to check parameter because of the system will it mechanically. The task was pointed toward building an ascendable and sensible goal for watering the horticultural land according to the dirt wetness content. The most goals were culminated, and an embodiment of the working model was shown on with the reasons of different components and code utilized for the execution. The framework was constrained by the IoT application named Blink and a component to store the data was conjointly made so it is regularly utilized for future associate analytics an improvement of the task. the more drawn-out term extent of the task is extended it space from not just water system anyway a full ton of elective boundaries like pH of the dirt, crop pace of development, kind of harvest and so on and feed That information to cloud to encourage supportive bits of knowledge so the overall yields are frequently misrepresented. So mechanical incorporation can work with ration assets that region unit scant and improve the get together.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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