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Irrigation System Operated Automatically by Solar Power

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A B S T R A C T

The lack of water and intermittent power supplies are major issues in India's agricultural sector. This issue results in subpar irrigation systems, which causes the soil's moisture content to decrease. The land would thereafter be unsuitable for agricultural losses. A appropriate irrigation system must be created to help keep the soil moist in order to prevent this situation. As opposed to other alternative energy sources, solar-powered systems are recommended for usage in developing nations because of their extraordinary durability and potential for long-term economic benefits. For grid-isolated rural areas in developing nations with high levels of solar radiation, solar powered water pumping devices may be the best option.

Keywords: Solar Power, Irrigation System

1. INTRODUCTION

The amount of land in India used for crop cultivation is reportedly declining at an accelerated rate. The availability of water supplies and outdated irrigation methods are the main causes of inconsistent productivity. Therefore, it is imperative to find technology solutions for work automation in agriculture. In particular, less complicated irrigation systems that use less water are crucial because they promote precision farming. Electric power powers technological irrigation and agricultural task automation solutions. India receives solar radiation for an average of 3000 hours every year (i.e. 4-7kWh of solar radiation per sq. meters). Therefore, solar-powered technological solutions for automating agricultural tasks can benefit Indian environmental circumstances more. We suggested an automatic irrigation system powered by solar energy. Sensors gather data on field water levels and provide updates to the farmer and microcontroller. Using a cell phone, the farmer may turn the motor ON and OFF based on the water level even from a distance. To ensure the proper water level in the field, the motor will, however, automatically start if the water level reaches the danger threshold. [14]15][16][17] [18].

2. METHODOLOGY

The writers of the paper have divided the paper into sections according to temperature and humidity. Five sections have been used to characterize their work. Section II reads the DHT sensor module's output and converts temperature and humidity values into a suitable number in percentage and Celsius scale, Section III displays humidity and temperature on LCD, Section IV defines analyzing and designing the system architecture, Section V shows the result and future scope. Section I defines the humidity and temperature using the humidity and temperature sensor DHT11.

Automatic Irrigation System Powered by the Sun The technique will be very helpful to farmers in order to conserve the scarce water resources that are available to them, according to the authors of this article. Their reliance on grid electricity will decrease thanks to the solar-powered technology. Additionally, the battery backup enables them to access the power whenever they require it. The tank's detecting device measures the water level. If the water level is high, it won't be permitted. The pH level and moisture sensors are wirelessly connected to the power source using the resonant converter method. By doing this, the chance that the sensors would malfunction as a result of a loose connection or wire damage will be reduced. With the aid of a Zigbee module, the user is also given information on the soil's pH level and current moisture content via SMS.

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System For Detecting Soil Nutrients And Smart Agriculture Based On IOT, This project gives a quick summary of the sensor-based soil monitoring system. Temperature, moisture, light, humidity, and ph value are all measured by various soil sensors. The MCP3204 A/D converter receives the data from the soil sensors, and from the A/D converter, it sends the data to the cloud via the Raspberry Pi. Finally, both a laptop and a mobile device can display information that has been stored to the cloud. Based on the facts, we can determine which crop will work best with the four soil parameters. Therefore, this cutting-edge technology aids farmers in understanding the precise properties of the soil, making the process of soil testing simpler.

3.DEVELOPMENT OF SYSTEMS

This technology offers automated watering that aids in measuring the soil's moisture content. This project's main audience consists of farmers who lack sufficient knowledge regarding the amount of water required for a given crop. Through a charge controller, a solar panel charges a battery. In this work, the motor receives supply straight from the battery. Here, the motor is controlled by the sensing circuit. The sensors that are employed are humidity, temperature, and soil moisture sensors. The sensor measures the soil moisture, temperature, and humidity at various locations throughout the field. The measured values are compared by the microcontroller using a predetermined value. The pre-set and measured value error is used to control the motor's ON/OFF status.

Proposed Approach

Solar panels are used in the suggested method to generate the necessary electrical energy. Dependence on the power grids will decrease thanks to the use of solar energy as a renewable energy source from solar panels. For the entire project, we'll employ sensors like level, wetness, and DHT11 sensors. The sensors will continuously track the level of water in the well, temperature, humidity, and soil moisture content so that we can use the NODE MCU to monitor and regulate the sprinkler and water motors. We will be able to use an Android application to track the system's performance because it is IoT-based. Consequently, both the farmers' efforts and the cost of electricity are reduced. Temperature, humidity, and wetness detected by the sensors will be shown on an LCD 16x2.

Diagram in Block

We'll leverage IoT-based automation in this proposed solution. We are employing the most recent NODE MCU microcontroller, which includes built-in Wi-Fi technology, in our system. The system functions with the aid of an Android internet application. The DHT11 sensor and moisture sensor will be used in this system's Blynk application, which will continuously monitor the temperature, humidity, and moisture level. We will be able to include touch-switches in that android mobile application so that we can manually operate the sprinkler and water motors as well. With the use of internet technology, we are able to remotely monitor and control from any location, which eliminates all the shortcomings of the GSM or Wireless networks used in the current system. Additionally, and for no charge, battery charging will be done with solar energy. The primary benefit of a solar system is that it produces power during the day, but because loadshading prevents it from being available constantly in rural areas, we may store it in a battery and use it for 24 hours.

4.RESULTS:

The system's control strategy in this work is created so that each of the various parameters can be regulated as follows:

The definition of two threshold limits—an upper limit and a lower limit—is necessary for the temperature management. An alarm is set off when the upper limit is reached, cooling the greenhouse atmosphere.

The fan is turned off while a heater is turned on when the temperature falls below the lower limit, and vice versa.

A user-defined threshold governs humidity management. A fogging system is turned on when the humidity in the greenhouse enclosure drops below this level and is turned off when the conditions are ideal. In order to lower the humidity, fans are turned on if it is higher.

5.CONCLUSION

As a result, we were able to successfully study how different sensors interact with the Node-MCU microcontroller. Additionally, we researched and worked on the project's hardware, which included drilling, soldering, wiring, designing the power supply, and creating PCBs. We discovered that a user may see and manage the agricultural field's equipment themselves utilizing IoT technology, in accordance with our application.[13] [14] 15] [16] [17] [18] .

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