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IOT BASED SMART IRRIGATION SYSTEM USING DUAL AXIS SOLAR TRACKER

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ABSTRACT

In In the current state of things, one of most severe problems affecting the world is rising spoiling in a relatively simple food grain chain, the cause of which is unrestricted water consumption. Furthermore, the constant extraction of water from the ground lowers the water level, causing a lot of land to progressively migrate into unirrigated zones. As a result, we are developing an autonomous irrigation system that evaluates the soil moisture ofthe plant and releases water as needed, therefore reducing unnecessary water consumption.Also, our effort seeks to provide real-time data to farmers regarding soil, weather, and crop conditions, so that farmers may have manual control over the water pump over the internet,ensuring an effective future watering schedule.

However, this configuration demands a significant amount of electricity, and given the looming shortage of non renewable resources, we are exploring using solar energy to power our suggested system. The use of solar panels is quite common and economical, however stationary solar panels may not be able to provide much valuable energy owing to the suns passage from east towards west. As a result, we are including a new solar based tracking system in which the solar panel is attached to servo motor that monitors the sun, ensuring that solar panel remains inclined towards sun for most of the day. The suggested system is tested in real time, and the results reveal improved power and efficiency.

I. INTRODUCTION

The watering system needs automation due to less water present in the land and also due to less rainwater. An automated watering technology powered by solar based tracking technology is an alternative solution for this type of serious and critical situation. The worldwide agriculture business is continually dependent on rains and also available water present in the used soil. The continual removal of soil water reduces the soil's moisture level. The right irrigation technique must be employed to handle the issue. Water waste will be reduced significantly if current soil water is utilised more efficiently. Finally, an automated watering system powered by solar power will be created. Sunlight will be used by photovoltaics in an automated irrigation that is based on solar tracking. That's this technology does not uses electricity.

This solar tracking irrigation system includes renewable sources such as solar energy to operate the irrigation system and a motor pump, and the circuit contains sensors that determine if the land is dry or moist. The primary and first goal or aim of this work is to automatically change the solar array that will be following location of the sun trough out the sky and to use water as efficiently as possible. We can build a dual-axis solar tracker with an irrigation technology using simple hardware and software which will be a reviving technology for agriculture feild. A LDR sensor, a servo motor, a solar panel, a moisture sensor, and a CPU are all essential hardware components. The LDRs are used to capture solar energy as an input. Four LDRs power the solar based tracker.

All the used LDRs will force the motor used for adjusting the solar based tracker in a such a way that it will face the sun all day. Watering crops is one of the most important aspects of increasing agricultural output; yet, due to water scarcity and manually irrigation facilities, the amount of water delivered may be more or lower than necessary. As a consequence, this project includes an automated watering system equipped with such a useful moisture sensor that is dipped in soil. Used moisture sensor always detects the precise amount presence of moisture content in order to provide the proper amount of water. The project is divided into two parts: the dual axis solar tracker system and the irrigation system.

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Solar Tracker with Dual Axis:

It is used to catch solar energy, and because it has two axes, it can revolve accordingto the location of the sun, absorbing the most sunlight. Furthermore, it is projected that using a tracking system instead of a fixed array can boost the production from solar panels by 30 to 60

Smart Irrigation System:

Agriculture is the major source of income in country like Nepal, a developing country. Agri- culture directly or indirectly supports two-thirds of the population. It provides a living for many individuals. Because it contributes the most to national GDP, it must be mechanised because manual irrigation methods are inefficient. Water delivery may be more exact and precise with an automated irrigation system.

II. METHODOLOGY

The following are two methodologies of both the parts of the project.

A. DUAL AXIS SOLAR TRACKING:-

The dual axis solar tracking is based on our application.This support will change the position of the plate with the help of two servomotors. Dual axis solar tracking system is installed over support and has an ability of moving the solar panel. The servo motor is a DC motor that assists in the rotation of the solar panel. Four LDRs are put over the solar plate to help monitor the high intensitylight that results in the movement of the solar panel. In this prototype, the Arduino UNO pins A0, A1, A2, and A3 are directly linked with LDRs and 1K resistors. To deliver adequate current to the electrical gadget, the LDR and resistors are linked in parallel. As the solar panel continues to spin, the Arduino UNO is commanded by the program's while loop statement. When UV photons strike the LDR, it functions as a sensor, providing values in 0 and 1 form that is low and high. Suppose this: in case the LDR1 detects a high light intensity, it sends an instruction to the Arduino. The Arduino will then command motor to spin to the sideof locating the LDR1 where this is inserted. This step is repeated in accordance of light effect.Input stage is constructed with vtg. divider ckt. to provide the necessary range of illumination under bright or low lighting conditions. This enabled measurements to be taken even when the sky was clouded.

B. GSM BASED IRRIGATION SYSTEM:

Now lets Move towards second phase of our proposed project, energy that is created by are moving solar panel will get transferred to a connected and used DC battery. This energy will get stored for future purpose in the battery. We will now be attaching a electrically run water pump to our DC battery so that the motor pump may turn itself ON on the energy supplied by solar panel that we used. We will be developing an intelligent watering system. In our system the water supply is going to be automated, which means that the pump used by us will only gets turned on and deliver water when the our land requires it. A cellular phone will control the water pump from any remote point. We are using a arduino based soil moisture sensor and GSM Module or gadget to do this operation.

We will install a moisture sensor in the field and link it to a microcontroller.The sensor that is moisture sensor is going to communicate given or present quantity of moisture to Arduino or to microcontroller we are using indefinitely, and it will compare it to a value that is already predefined. If moisture level in the our land falls below a predefined level, Arduino or any microcontroller that we are using is going to activate our GSM Module in system, and it is going to send a text message to our user indicating to him like moisture level in the soil has fallen. After receiving a text message our user if he wishes can activate or may turn on our water pump by just sending an text SMS. Our used GSM module is going to send the data to the used microcontroller after receiving the SMS, andthe microcontroller used is going to order or send a command for operating the water pump. So after starting our motor and after distributing water to the field and at the same time moisture sensor will send moisture level to used microcontroller. As now our field or land is getting a constant water supply so moisture level of our field will automatically start increasing so after increasing moisture this new moisture level will again one time be compared to our predefined moisture level set by the user in microcontroller used. As soon it reaches to a certain

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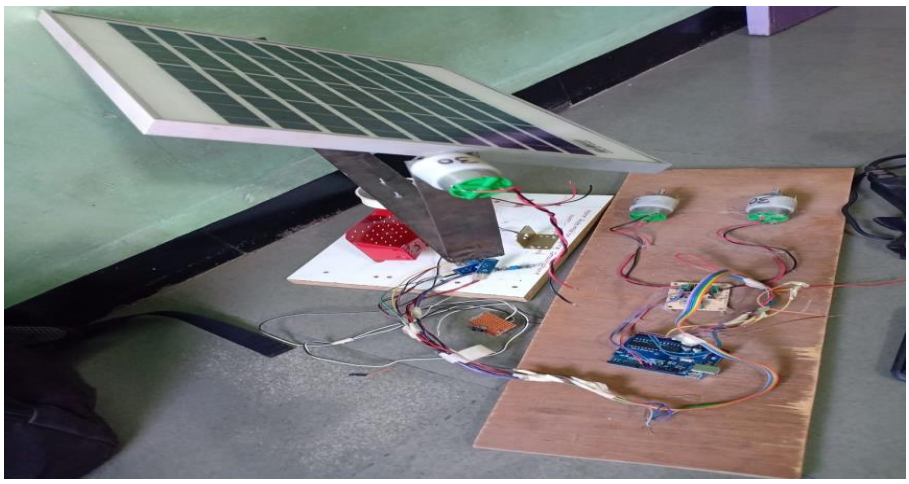
maximum level once again the used microcontroller is going to activate our used GSM module and that will again order or going to send a message to the us related to increased moisture level. Now if the user who is using this system wishes he definitely may turn off his water pump just by sending a text sms and he alos can manage to irrigate his desired area of land just by sending a text SMS on a single click. In such a way our system is going to become an 100 percent automated system also we will be drawing as max as possible power from the sunlight.

III. MODELING AND ANALYSIS



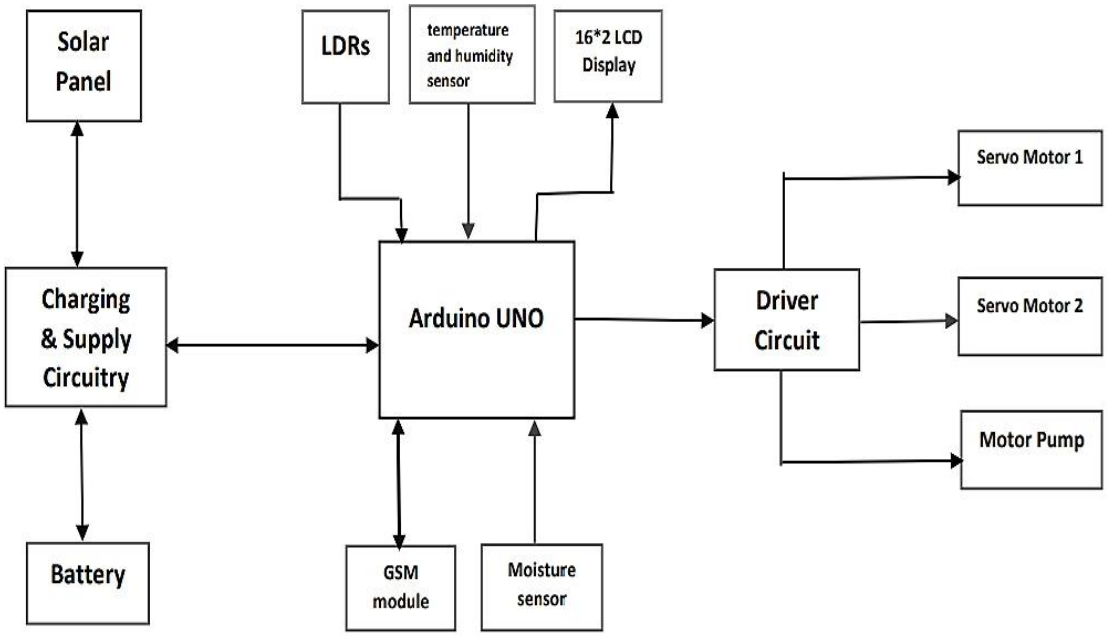


Figure: Block diagram

IV. RESULTS AND DISCUSSION

Finally, the system was created to produce the anticipated results. Several issues arose throughout the construction of project, including fault in the connections, faults in internal device, and programming. Finally we have developed a system which can truly satisfy goal of our mission. Results showed that revolving solar panels catch more energy as compared to static solar panels.

Smart irrigation adapts daily weather, plant kind, soil type, and slope, as well as providing site specific weather modifications in order to adjust the exact microclimate on our property for decreasing the danger of overwatering. Controllers may also be modified from mobile phones and assist to identify agricultural land and soil moisture state, monitor and manage remotely based on user requirements, our project's end product is as follows:

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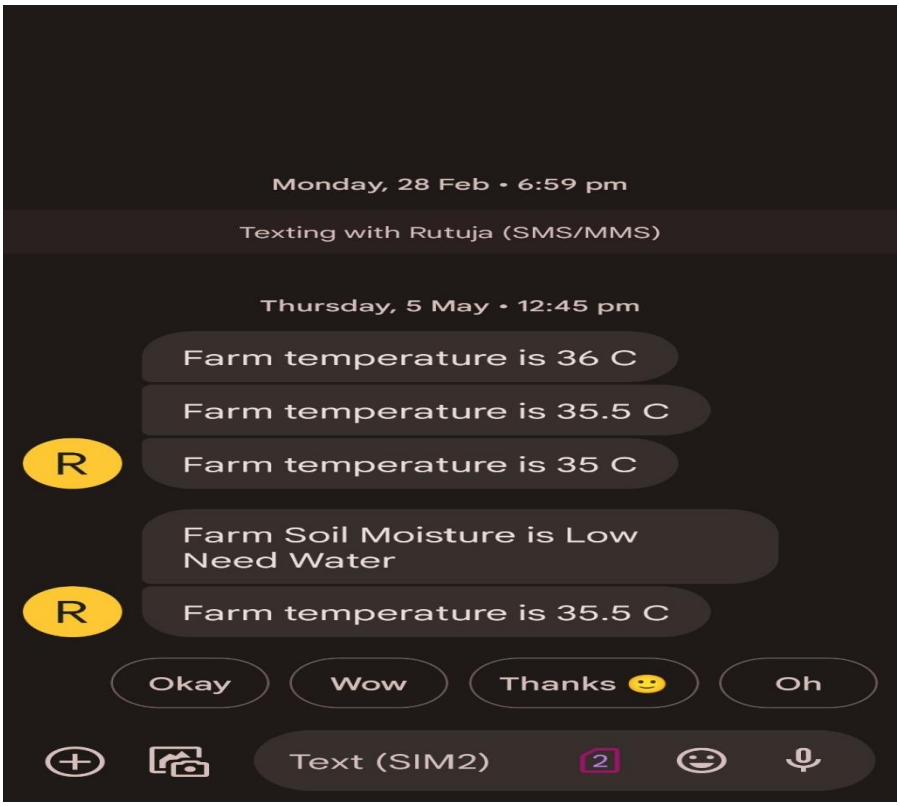

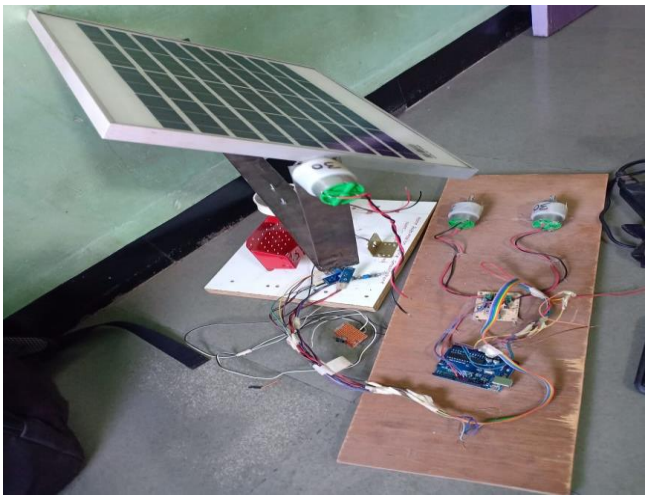

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V. CONCLUSION

When this system is implemented, agriculturists will benefit from an autonomous watering system with solar tracking. This automated irrigation system is activated when the sensor detects that the soil requires water. When the crops demand water, the system can automatically supply it. The sun-powered board provides the energy required for the water pump and control system. An automatic irrigation system is used to maximise the use of water by reducing waste and human labour. Because the system is self-starting, it requires very minor assistance and thought. Tracking arrays can also be used to improve the daily pumping rates. This method demonstrates the viability and use of utilising solar PV to power the directing demands of a sprinkler water system. Even though this method demands a larger investment, it solves more irrigation problems over time.

VI. REFERENCES

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