International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 10 Issue 6 ǁ 2022 ǁ PP. 841-845

"Iot Based Smart Agriculture System with Dual Axis Solar Tracker"

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Abstract: *Internet of Things (IoT) plays a pivotal part in smart agriculture. Smart agriculture is an emerging conception, because IoT detectors are able of delivering information about their agriculture fields. IoT grounded smart husbandry system with binary axis solar tracker uses solar tracker for power force. Monitoring environmental factors is the major factor to enhance the yield of the effective crops. The ideal of our design is to monitor temperature and moisture of the ranch using sensors and transmit information to farmers mobile using sms or email. The system will come more independent if we supply power to it through solar panels. The solar panels can be handed a double axis solar tracking system. A battery can be used as an indispensable power source in the absence of sun. Microcontroller is needed to interconnect all the detectors and bias. We'll use Arduino, a 9v solar panel, humidity ,position detector, a 9v battery. A prototype of this irrigation system is developed with the main advantages of easy installation, reduced conservation, water conservation, and need grounded irrigation watering.*

Keywords: *Nodemcu, solar panel, Temperature and Humidity sensor, Soil moisture sensor, L298 Motor driver, Arduino uno, IR sensor,AC Water Pump, DC Motar with 10RPM.*

Date of Submission: 01-06-2022 Date of acceptance: 12-06-2022

I. INTRODUCTION

For the irrigation system atomization is veritably important essential because of the shortage of water in soil and lack of rain. Automatic irrigation system with solar tracking is the indispensable result for this type of situation. Agrarian system in world is always in need and depends on the presence of water in the soil. The nonstop pulling eschewal of soil water will reduce the humidity position of the soil. To overcome this issue intended irrigation system has to be followed. The better application of the available water will reduce the quantum of destruction of water significantly. For this reason, automatic irrigation system . is to be designed which will use the solar energy. The automatic irrigation with solar tracking system receives sun light through photo-voltaic cells. Thus this system is not dependent on electric power. This automatic irrigation with solar tracking system uses solar energy to power the irrigation pump and the circuit comprises of detectors which will sense the soil for its dry or wet condition. The main ideal of this design is to rotate the solar panels according to the sun's position automatically and to use the water in utmost effective ways.

1.1.1 Literature Review

A single axis solar tracks the sun east to west, and a two- axis solar tracks the diurnal east to west movement of the sun and the seasonal declination movement of the sun. Concentrates solar power systems use lenses or glasses and tracking systems to concentrate a large area of sun into a small ray. PV converts light into electric current using the photoelectric effect. Solar power is the conversion of sun into electricity[1]. An IOT Grounded Crop- field covering an irrigation robotization system describes how to cover a crop field. A system is developed by using detectors and according to the decision from a gar¸con grounded on tasted data, the irrigation system is automated. If the irrigation is automated also the humidity and temperature fields are dropped below the implicit range. The stoner can cover and control the system ever with the help of operation which provides a web interface to stoner[2].

1.2 Problem definition

Irrigation is the most important cultural practice and utmost labor ferocious task in diurnal agricultural sector. Knowing when and how important to water is two important aspects of irrigation. To do this automatically, detectors and styles are available to determine when plants may need water. Robotization involves medium of all the artificial conditioning so as to enhance the speed of product, reduction of cost,

effective use of coffers. With the growing demand of electricity and concern for the environmental impact of fossil energies, perpetration of eco-friendly energy sources like solar power is rising. The effectiveness of the single axis shadowing system over that of the stationary panel is calculated to be32.17 percent and the binary-axis shadowing system over that of the stationary panel is calculated to be81.68. Due to seepage in rain spouts, destruction of water is caused there's imbalance in distribution of labour. After growth of crops, water reaches the basins in disproportionate volume thereby causing destruction of water, creation of problem of water logging. Currently Growers are dependent on rain and Boring wells to irrigate their lands. They need to turn ON/ OFF water pump manually. This process is time consuming because they have to check the soil manually in regular intervals else the crops can get damaged because of failure of water force. With the growing demand of electricity and concern for the environmental impact of fossil energies, perpetration of eco-friendly energy sources like solar power is rising. Due to seepage in rain spouts, destruction of water is caused there's imbalance in distribution of labour.

1.2.1 Need and Scope of the Project

The design has vast compass in developing the system and making it more stoner friendly and the further features of the system like By installing a webcam in the system, prints of . the crops can be captured and the data can be transferred to database. Speech grounded option can be enforced in the system for the people who are less knowledgeable. This technology in future will enable the farmer to control view husbandry direction from home through colorful styles like internet, mobile. The ranch can be defended from creatures, fire and any anonymous person entering the field. Insects can be detected and avoided. Growth of crops can be informed to the growers. This system is used to control home appliances tenuously and offer security when the proprietor is down from the place. This energy is also used for fencing for husbandry field, lighting, and bus cleaning of the solar panel and NodeMCU(WiFi) technology is used to cost the information about the motor running and which part of the field is irrigating and humidity position etc

1.3 Design Methodology

1.3.1 System Design

We're making the irrigation system an intelligent one. In this system the water force will be an automated done using switch button that means the pump will force the water only when the land needs it. And the water pump will be controlled by a cellular phone from any remote position. In order to achieve this task we're making use of a Humidity detector and a NodeMCU Module or device. The humidity detector will be placed in the field, and it'll be connected to the microcontroller. The humidity detector will be continuously transferring the quantum of humidity to the microcontroller, where it'll be compared with a predefined value. Now whenever the humidity position becomes lower than the predefined position, the microcontroller will spark the NodeMCU Module, which will shoot a communication to the stoner, stating that the humidity position of the land has dropped. Now upon entering the communication the stoner can spark or switch on the water pump by just transferring a SMS. After entering the sms the NodeMCU module will shoot the data to the microcontroller and the microcontroller will shoot a command to spark the water pump. After the motor gets started and starts supplying water to the field, contemporaneously the humidity detector will be transferring the humidity . position to the microcontroller. Since the field is getting water force now the humidity position of the field will start adding, this increase in the humidity will again be compared with a predefined humidity position by the microcontroller. Once if it reaches the maximum position again the microcontroller will spark the WiFi module which will again shoot a communication to the stoner about the increase in the humidity position. Now if the stoner wants he/ she can switch off the water pump by transferring a sms and they can manage to irrigate asked plot by transferring an SMS. This is how the system will come an automated system also we're drawing maximum power through the sun Now moving to the another part of the design, the energy generated through the solar panel . will be transferred to a DC battery. The battery will store the energy for farther operations.

Now moving to the another part of the design, the energy generated through the solar panel . will be transferred to a DC battery. The battery will store the energy for farther operations. Now we're concatenating a water pump to the battery so that the motor should run on the power generated by the solar panel. The binary axis solar tracing network is put over the support which can shift the solar panel corresponding to our operation. This support will move the plate by using two DC motor. DC motor which helps to rotate the solar panel. Over the solar plate, four LDR deposed which helps to track the high intensity light according to which the solar panel starts moving. In this case, the pins of Arduino UNO i.e. A0, A1, A2, A3 are used which directly connected to LDR. The Arduino UNO are instructed by the program having while round statement as this solar panel can be continues to rotate. When the light of ultraviolet shafts incident on the LDR, it acts as detector which gives the input of high and low current value in 0 and 1 form. Consider, if LDR1 have high light intensity also it'll sense the light intensity and give . direction to the Arduino. This Arduino will instruct to the motor to rotate over the side of LDR1 position where it's being placed. The same this process gets continues according to light effect. The input stage is designed with a voltage separator circuit so that it gives asked range of

illumination for bright illumination conditions or when there's dim lighting. This made it possible to get readings when there's cloudy rainfall.

1.3.2 Block diagram and Circuit diagram

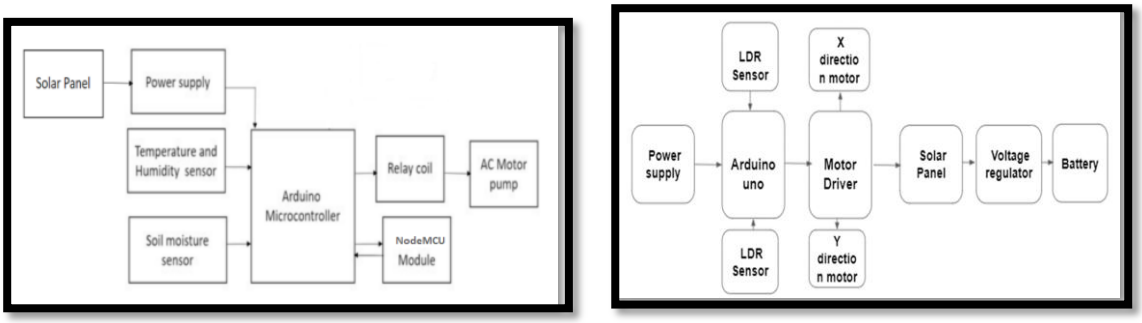


Fig1: Block diagram of IOT Base Smart Agriculture System with Dual Axis Solar Tracker.

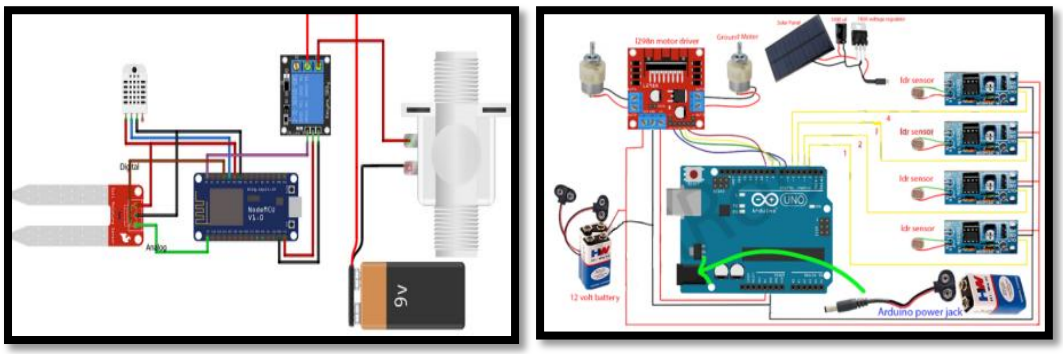


Fig 2: Circuit diagram of Block diagram of IOT Base Smart Agriculture System with Dual Axis Solar Tracker

1.3.3 Components

1.3.3.a For Iot Based Smart Agriculture System

1. NodeMCU module
2. Soil moisture sensor
3. Temperature and Humidity Sensor
4. AC motor pump
5. Arduino Uno
6. Jumper wire

1.3.3.b For Dual Axis Solar Tracker

1. Arduino Uno
2. DC motors of 10 RPM[2 units]
3. Solar Panel
4. Light Dependent Resistor (LDR) [4 units]
5. L298 Motor drive
6. Battery
7. Jumper wires

1.3.4 System Working

First Soil moiture sensor detects water content level in soil. If water level goes below the certain level then system send alert message (turn on water pump) to the user via email and send notification to the blynk website.After alert message user can turn ON/OFF water pump using switch on blynk website. For power supply we used dual axis solar tracker which produce more power as compare to single axis or normal solar system.

1.3.5 Software Implementation

1.3.5.a The Arduino Integrated Development Environment (IDE).

It is used for writing code, compiling the code to check if any errors are there and uploading the code to the Arduino and nodemcu.

1.3.5.b Blynk app

Blynk app can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

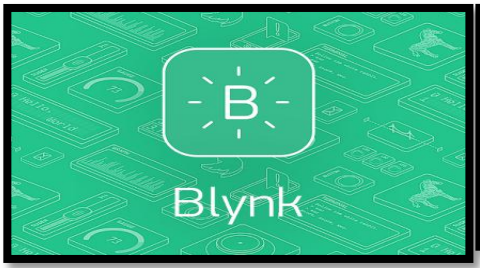


Fig :- 1.Blik app

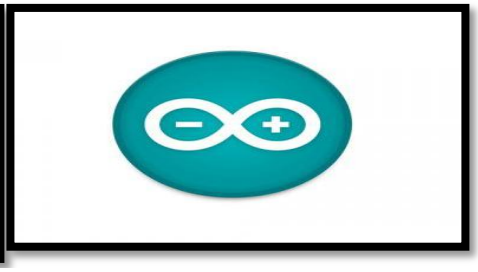
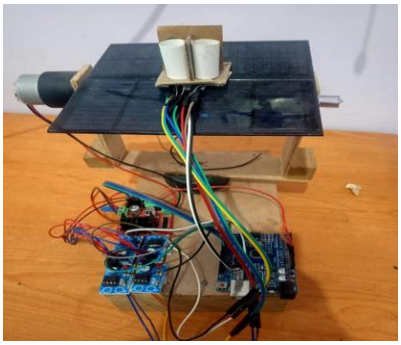
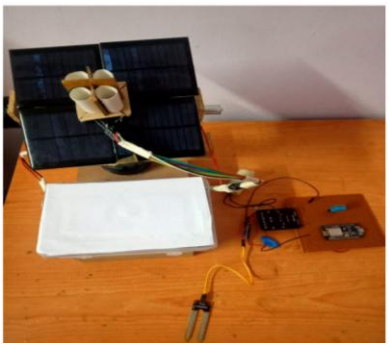


Fig :- 2.Arduino (IDE)

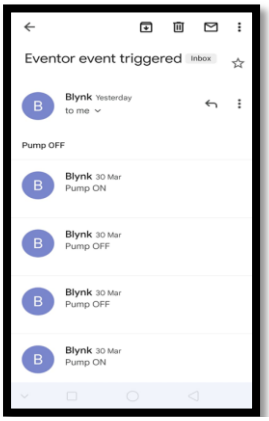
1.3.6 Hardware Implementation





II. RESULT AND DISCUSSION

The results obtained are as discussed below



2.1 Application

The fundamental change in all aspects of practices of farming is possible by implementing the latest sensors and IoT techniques in agricultural methods. Now, the seamless integration of wireless sensors and the Internet of Things in smart farming can take farming to unimaginable levels. By following smart farming methods, the internet can help improve solutions to many traditional agricultural problems such as yield optimization, drought response, soil aptitude, irrigation and pest control. Also we can use this system for gardening. The additional features of the system like: By installing a webcam in the system, photos of the crops can be captured and the data can be sent to database. Speech based option can be implemented in the system for the people who are less literate. This technology in future will enable the planter to control view agriculture

direction from home through various methods like internet, mobile. The farmstead can be defended from animals, fire and any anonymous person entering the field. Insects can be detected and avoided. Growth of crops can be informed to the growers. This system is used to control home appliances tenuously and offer security when the proprietor is away from the place. This energy is also used for fencing for husbandry field, lighting, and auto cleaning of the solar panel and WiFi technology is used to fetch the information about the motor running and which part of the field is irrigating and humidity level etc.

III.CONCLUSION

The fundamental change in all aspects of practices of agriculture is possible by executing the latest detectors and IoT techniques inagricultural methods. Now, the seamless integration of wireless detectors and the Internet of Things in smart husbandry can take farming to unconceivable levels. This system has proved that it captures the maximum solar energy with the help of its rotating panels and it also helps in precision irrigation as the readings captured by sensors are accurate and the motor turns on/off based on those readings. By following smart agriculture methods, the internet can help improve results to numerous traditional farming problems similar as yield optimization, drought response, soil aptitude,irrigation and pest control.

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