SOLAR ENERGY BASED AUTOMATIC AGRICULTURE MONITORING SYSTEM

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Abstract :

Solar energy is one of the renewable energy sources, which is significantly contributing to the sustainable energy supply, used for automatic agricultural monitoring system. The objective of this paper is to propose a environmental information monitoring system for agricultural operations which are constantly technology driven due to labour shortages, increase in labour cost, and trends in new and advanced technology applications. It is a good replacement of manually module checking which is not recommended because of time-consuming, less accuracy and potentially dangerous to the operator.

This paper deals with the automatic agricultural monitoring system for measuring the agricultural challenges such as soil moisture, temperature, humidity, water level. With the help of the sensors and IOT, the frequent updation of field environment can be made automatically. The Arduino UNO controller is considered to overcome the controller complexity and hence the hardware implementation of automatic agriculture monitoring system is implemented.

key words : solar panel, Arduino microcontroller, LDR, water level indicator, DHT11 sensor, soil moisture sensor, LCD, LED, water motor.

I .INTRODUCTION

Agriculture plays the important role in the economic development especially in developing and most populated countries like India. Water for irrigation is dependent on monsoons, which are highly unreliable due to sudden changes in the climatic conditions. Hence demand for the new technique to reduce the dependency of rain is on huge demand. To solve energy crisis in today's world solar energy is the best alternative renewable energy resource. For the efficient utilization of solar energy Photovoltaic generation approach is used. Monitoring parameters of temperature ,humidity and moisture is an important means for obtaining high-quality environment. Remote monitoring is an effective method in order to avoid water wastage and improve efficiency. Techniques, which are at present, are driven by electrical power and on/off scheduling controlled and communications are wired. Nowadays, use of the wireless technology for an intelligent irrigation system has become a popular research. In this paper we propose an Wireless sensor network based remote monitoring for automatic irrigation system using solar power to drive water from pump to land, bore well to a tank the system consists of wireless sensor network nodes and network management platform.

II. BLOCK DIAGRAM

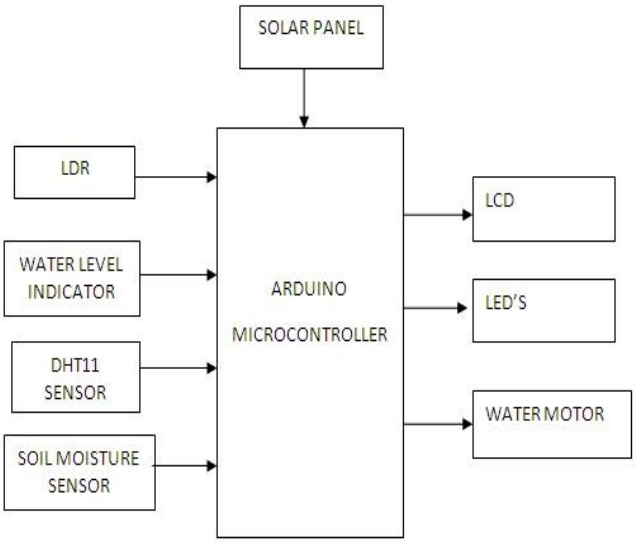

Figure 1:Block diagram of solar powered automatic agriculture monitoring system

A. Hardware Components:

Arduino MicroController

LDR

Water level sensor

DHT11 Sensor

Soil Moisture Sensor

Water Motor

LED'S

LCD

Solar Panel

Battery

B. Software:

Arduino

C language.

III. HARDWARE COMPONENTS AND ITS SPECFICATIONS:

A.Solar panel:

Solar energy is the most abundant source of energy in the world. Solar-powered photovoltaic (PV) panels convert the sun's rays into electricity. This generated electricity can be stored in the battery for charging purposes. In this technique we are utilizing solar panel of 20Wand 12V is utilized for power supply.

Figure 2: Solar Panel

B.Arduino Microcontroller:

We are using ATMEGA328P arduino microcontroller instead of 8051 microcontroller, because arduino microcontroller has many advantages. It has 28 pins. It has internal Analog to Digital Converter.

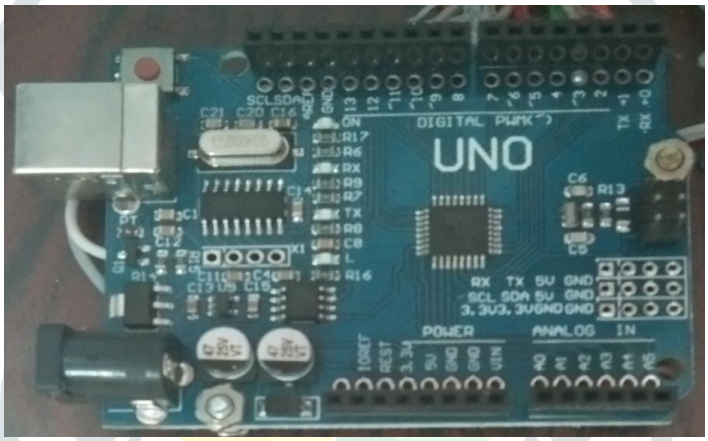

Figure 3: Arduino microcontroller

C.Water level float type sensor:

A float switch is utilized to detect the level of fluid inside a tank. The switch is utilized for saltwater tank, freshwater tank, cultivating, aquariums for power head control, fish tanks, filtration, warming, siphons, lakes. It very well may be effectively changed over from typically open to regularly close by inserting float in the tank.

Figure 4: Water level float sensor

D.Temperature and Humidity sensor:

Humidity sensors measure the volumetric water content in the earth. Advancements generally utilized include:

• The mediator properties of water for neutrons are used to gauge soil dampness content between a source and locator test.

• Electrical resistance of the dirt

Present day electronic gadgets use temperature of buildup. Here in this paper changes in electrical capacitance or resistance is utilized to quantify humidity changes. We are utilizing DHT11 sensor for finding the temperature and humidity esteems.

Figure 5: Temperature and humidity sensor

E.Light Dependent Resistor:

A photo resistor or Light Dependent Resistor or CdS (Cadmium Sulfide) Cell is a resistor whose resistance diminishes with expanding occurrence light force. It can likewise be alluded to as a photoconductor.

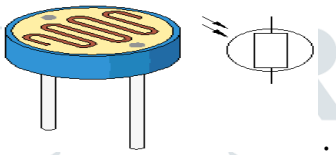

Figure 6: Light Dependent Resistor

F.Soil Moisture Sensor:

Soil moisture sensor measures the volumetric water content in the soil .The direct measurement of soil moisture requires removing, weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using other property of the soil such as electrical resistance.

G.Water Motor:

DC 3-6V Micro Water Pump For Fountain Garden Mini water circulation System DRY project. It is a low cost and small size Water Pump Motor, which can be operated from a 3 to 6 V. power supply. It can be used up to 120 liters per hour with very low current consumption of 220 mA. A Tube is Connect the motor outlet, the water level is always higher than the motor.

Figure 7: Water motor

H.LED:

A LED is a semiconductor light source. The light discharges when current courses through it. Electrons in the semiconductor recombine with electron openings and discharging vitality as photons. The shade of the light is dictated by the vitality required for electrons to cross the band hole of the semiconductor. White light is gotten by utilizing a layer of light-emitting phosphor on the semiconductor gadget.

I.LCD:

A liquid crystal display (LCD) is a display device. It is made up of any number of color or monochrome pixels arrayed in front of a light source or reflector.

IV. WORKING PROCEDURE:

The entire system is powered by solar panel of 12V with battery backup. We are using the battery for harvesting electrical energy which gets energy from solar panel in daylight, that stored energy we are using for evening time. The Light dependent resistor is used to identify the morning or evening. The LED's will be glow at evening time otherwise it will be off. The Water level sensor is used to find the tank is full or empty. The Soil moisture sensor is used whether the soil is dry or wet. When the tank is empty ,whether the soil is dry or wet, the water motor is in off condition. When the tank is full and the soil is in wet condition ,the water motor is in off condition. When the tank is full and the soil is in dry condition, the water motor will be automatically run. These conditions are important. Temperature and Humidity values are displayed in the Liquid crystal display (LCD).

V.RESULTS AND DISCUSSIONS

The below figure shows the development of solar powered automatic agriculture monitoring system. Firstly, the switch is in ON condition, the LCD will be displayed as below like Solar based agriculture system.

Figure 8: Solar based agriculture system is displayed on LCD

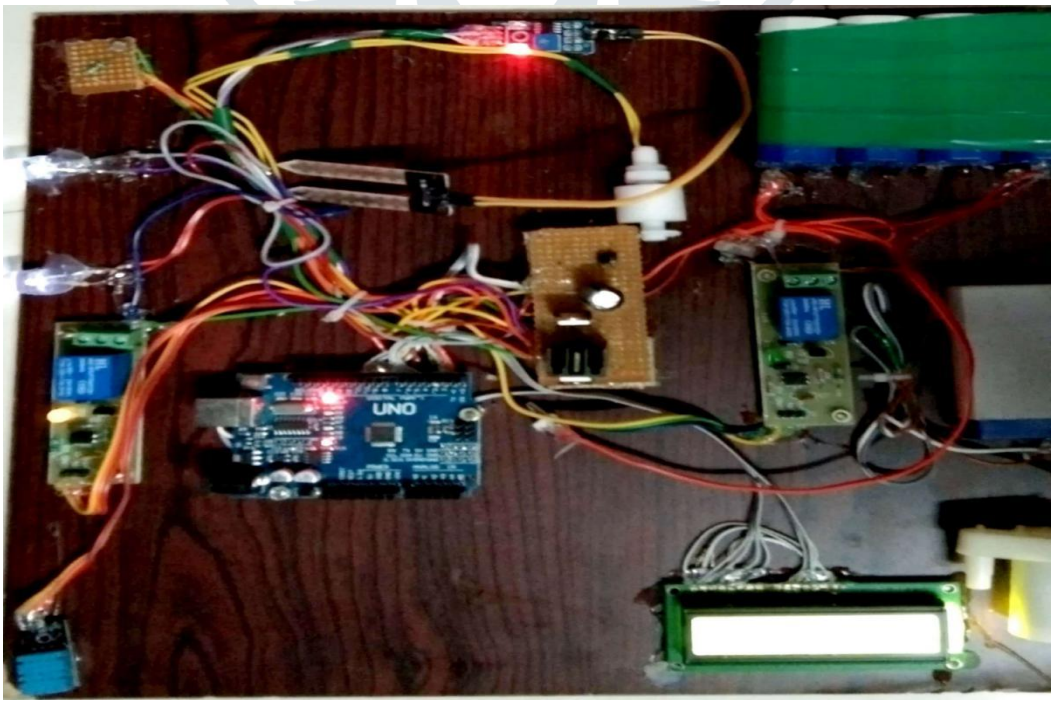

Figure 9: Experimental setup

Figure 9 shows the Hardware implementation of solar energy using for automatic agriculture monitoring system. By using this, we can reduce the labour cost and increase the efficiency of the output.

VI. FUTURE SCOPE:

The solar powered automatic agriculture monitoring system will be exceptionally valuable in the future.To exhibit the usefulness and execution of the controller system, the model was actualized and tried. This will In future the advances in nano innovation. Give we a chance to have an expectation so that in one fine day all ranch arrives in India are given agriculture monitoring system with SMS alert, help to limit over water in the harvest and production cost.

VII. CONCLUSION:

Agriculture has been the backbone of human civilization. As the generation evolved, man developed many methods for agriculture to supply water to the land. In this paper hardware implementation of agriculture monitoring system is explained with the help of Arduino software.By this system, abnormalities in the field are noted and correction is made easily. Arduino software is used to monitor and control the various sensor output and motor operation.

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