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Dual land Utilization for Cultivation of Vegetables and Solar Power Generation

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ABSTRACT: Agriculture is backbone of our country. About 70% of India's population depends on agriculture and more than 30% of national income comes from agriculture. Agriculture is important not only from economic point of view but has deep rooted influence on our social, political and cultural life. Demand is always greater than generation. India is getting abundant amount of solar energy in summer. Considering the global crisis, renewable generation is essential for the fast growing needs. From the literature survey, it is found that instead of using land only for farming, it will be beneficial if the land is used in dual manner. On the same note, proposed model is aimed at utilizing land in a dual manner for generation of electricity and cultivation of crops. In the prototype model, land will divide in three parts. In outer two sections, normal crops like wheat, cotton etc. will be cultivated. In the middle section, vegetable crops which requires low intensity sunlight like cucumber, tomato, lettuce etc. will be cultivate. Generated electricity will be used for automatic watering of plants and solar tracking system. The proposed model is considered as a real time project which helps farmer in dual manure for power generation and irrigation system without disturbing regular agricultural activities.

KEYWORDS: Microcontroller; LDR; DC Geared Motor; Water Pump Motor etc.

I.INTRODUCTION

To provide an efficient solar system, a single axis solar tracker was designed, built and tested to maximize the amount of solar energy that can be received from the sun. Single axis solar tracker system had calculated energy gain of 34.11% compared to a fixed solar panel. This is a solar tracking system which can be used as a power generating method from sunlight. This method of power generation is simple and is taken from natural resource. This needs only maximum sunlight to generate power. This project helps for power generation by setting the equipment to get maximum sunlight automatically. This system is tracking for maximum intensity of light; this system automatically changes its direction to get maximum intensity of light. The aim of our project is to utilize maximum energy solar energy through solar panel. For this a single axis sun tracking system is proposed. The solar panel tracks the sun from east to west automatically for maximum intensity of light. By using the power generated from tracking system, it can be utilized for the further agricultural applications like automatic irrigation system etc. Automatic plant watering system is actually a model of controlling irrigation facilities that uses sensor technology to sense soil moisture with a microcontroller in order to make a smart switching device to help millions of people. Therefore, by using this arrangement land is used in dual manner in agriculture sector which can be beneficial for farmers for the fulfilment of future needs.

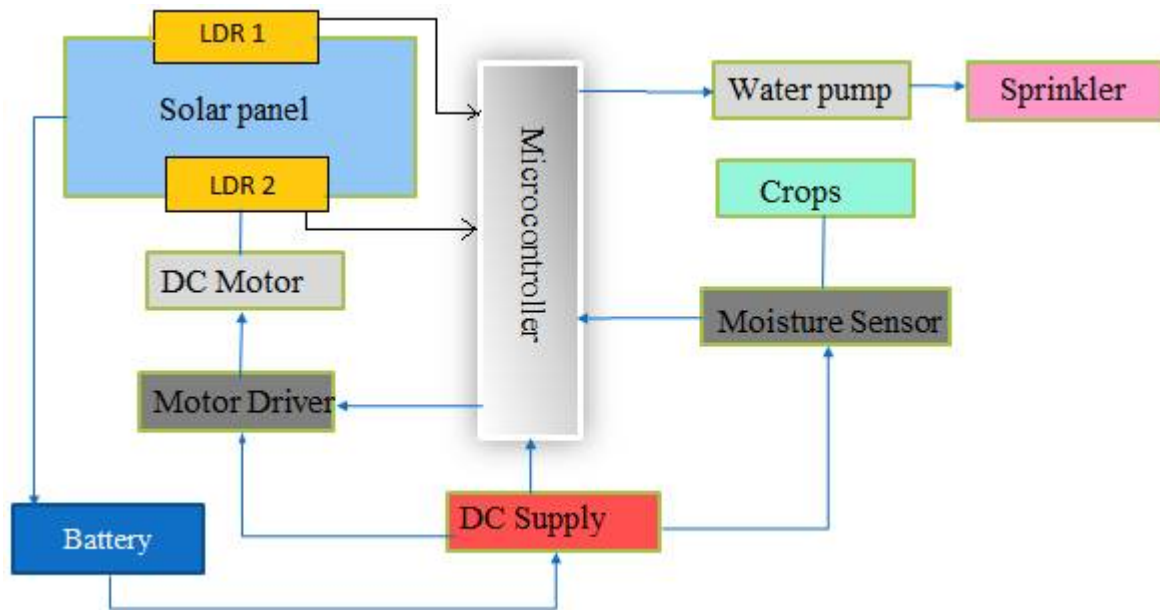
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II. BLOCK DIAGRAM



III. WORKING

In the developed project, Arduino UNO is brain of system, it connected between automatic watering system and solar tracking system. Arduino UNO used for controlling application. Now first stage of the project is generation of Electric power. By using single axis solar tracker, electricity is generated with the help of moving position of single axis solar tracker. IR sensor senses signal through LDR sensor as a input of microcontroller. Microcontroller gives output signal to DC motor, accordingly DC motor rotates solar panel in East or West. Rechargeable battery is charged through generated Electricity and used for the further agricultural applications. In second stage use generated power for the automatic irrigation system. Soil moisture sensor will sense the humidity of the soil and it will give signals to microcontroller. Further arduino will give signal(output) to the water pump and as per the instructions received, sprinkler will either on or off for the irrigation system.

IV. MOISTURE SENSOR

Soil moisture sensors measure the volumetric water content in soil. [1] Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type , temperature , or electric conductivity . Reflected Microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners. Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potential ; these sensors are usually referred to as soil water potential sensors and include tensiometers and gypsum blocks. The soil moisture sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity and therefore the water content of the soil.



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V. DC GEAR MOTOR

Geared DC motors can be defined as an extension of DC motor which already had its Insight details demystified here . A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor.

VI. WATER PUMP MOTOR

As the name home implies, water pumps pump water. Whether that be in a vehicle, at a business, in the home, or in a well, shoppers can probably find a water pump to fit their vehicle or to help them draw water from the ground in a self-dug well to be used in pressure tanks within the location. Vehicle water pumps help regulate the flow of water through a vehicle's cooling system; when the seal on these go bad, the whole pump must be replaced. Located within the home or business, pressure water pumps regulate the water pressure year round, controlling water flow to different areas of the location. Water pump bring water from a source to an irrigation system. They can be used to increase water pressure when provided pressure is not high enough. A pump draws and expels water using its intake and discharge line. A pump motor is a DC motor device that moves fluids. A DC motor converts direct current electrical power into mechanical power. DC or direct current motor works on the principal, when a current carrying conductor is placed in a magnetic field, it experiences a torque and has a tendency to move. This is known as motoring action. Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work by moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, come in many sizes, from microscopic for use in medical applications to large industrial pumps. 100RPM Centre Shaft Economy Series DC Motor is high quality low cost DC geared motor. It has steel gears and pinions to ensure longer life and better wear and tear properties. The gears are fixed on hardened steel spindles polished to a mirror finish. The output shaft rotates in a plastic bushing. The whole assembly is covered with a plastic ring. Gearbox is sealed and lubricated with lithium grease and require no maintenance. The motor is screwed to the gear box from inside. Although motor gives 100 RPM at 12V but motor runs smoothly from 4V to 12V and gives wide range of RPM, and torque. Tables below gives fairly good idea of the motor's performance in terms of RPM and no load current as a function of voltage and stall torque, stall current as a function of voltage.

VII. L293D MOTOR DRIVER

It has two connections for 5v servos connected to the arduino's high resolution timer. It's4 H-bridges and L293D chipset provides 0.6A per bridge it comes with thermal shut-down protection. It can run Motors on 4.5V-25V DC. It provides up to 4 bi-directional dc motors with individual 8bit speed selection with single coil. The pull down resistors keep motors disabled during power up.

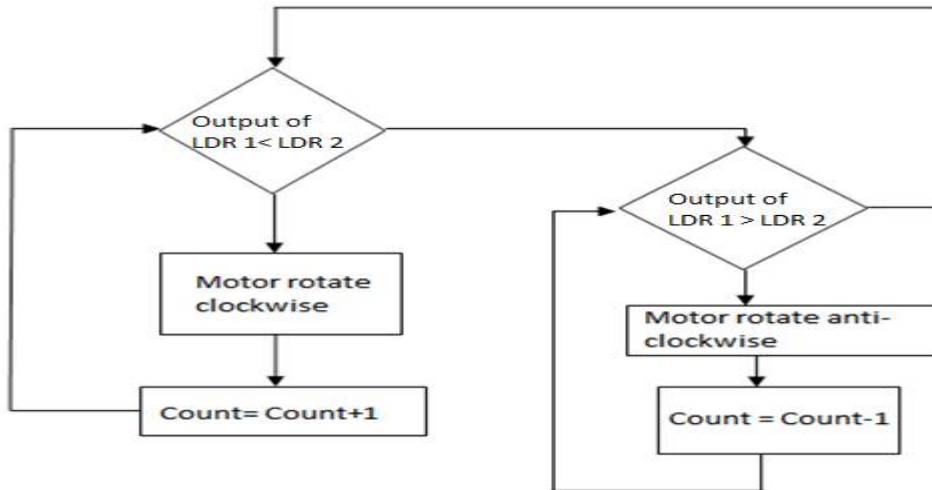
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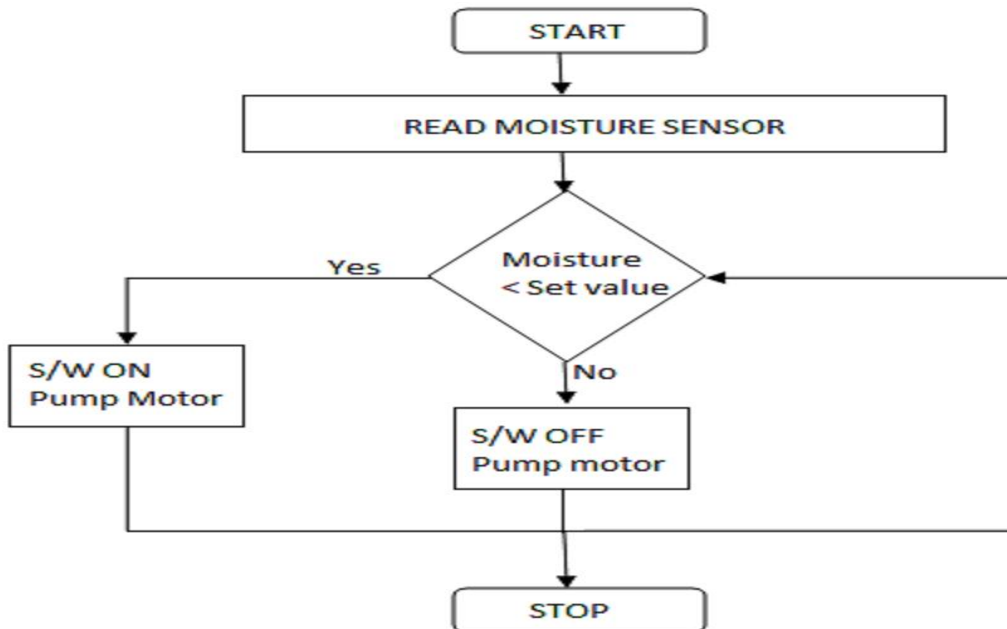
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VIII. FLOW CHART FOR SOLAR TRACKING



IX. FLOWCHART FOR SOIL MOISTURE SENSING



X. CONCLUSION & FUTURE SCOPE

Single Axis Sun Tracking Solar System model is developed by considering given specification. The system is able to track and follow the Sun intensity in order to get maximum power at the output regardless motor speed. Besides, low speed DC geared motor has been used for neglecting motor speed parameter and therefore the system only focuses in tracking of Sun intensity. By using automatic watering system, it is possible to control amount of water released from the process of watering the plant.



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With utilizing the latest technologies and advanced sensors, we could serve many purpose in the field of agriculture. In future we can use this technology as a real time project. We can use this technology for the power generation and use that energy for the increasing efficiency using the tracking system. Use the generated energy for agricultural application and we can transfer the excess generation to the grid. In future additionally can we modify the system with adding automatic pesticide system. We can also use the system as green house effect with some modifications. The real time implementation will not disturb the regular agricultural activity like seeding, soughing, plugging and movement of the tractor, other agricultural tools can easily possible.

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