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SOLAR POWERED MECHANIZED DRIP IRRIGATION

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Abstract:- Two innovative technologies, automated dripping irrigation systems and solar tracking systems, are pivotal in promoting efficient resource utilization and sustainable development The efficient utilization of water resources is crucial in agricultural practices, particularly in regions facing water scarcity. Drip irrigation systems have emerged as a sustainable solution to optimize water usage in agriculture. However, conventional drip irrigation systems often suffer from inefficiencies due to static positioning of the irrigation components, leading to uneven water distribution and wastage. This is an innovative approach to address these challenges by integrating a solar tracking system with automated drip irrigation technology. The system proposed adjusts the position of solar panels dynamically to optimize energy capture throughout the day. This ensures a consistent power supply to the drip irrigation system. Moreover, sensors and actuators are integrated into the irrigation components for real-time monitoring and control of water distribution, which is based on soil moisture levels. By merging solar tracking technology with automated drip irrigation, the system aims to improve water efficiency, decrease energy dependency, and optimize crop yields.

1. INTRODUCTION

1.1 GENERAL

The proper approach for the irrigation scheme is to be applied due to a shortage of rain and water scarcity in the soil. Agricultural fields are always in need and dependent on soil water level. But continuous extraction of soil water decreases soil moisture levels to avoid this problem should be pursued by expected irrigation system [1]. Yet inefficient use of water contributes to large amount of water being wasted. Automatic plant irrigation system is designed for this purpose using humidity sensor and solar energy. The device proposed draws power from sunlight via photovoltaic cells. Therefore, the machine cannot rely on the electricity. In this proposed model, power the irrigation pump by using sunlight energy. The circuit contains a soil moisture sensor, which is inserted into the soil to determine whether the soil is wet or dry. The entire device is managed through a pic microcontroller. When the soil's moisture level is low, the sensor senses the soil condition and the relay device connected to the motor switch is given condition. In dry condition it will on and turn off the motor when the soil is in a wet state [2]. The soil moisture level is sensed by the sensor inserted into the soil which gives the microcontroller a signal as to whether or not the soil requires water. The signal received from the sensor via the comparator output is followed by instructions from the software that are stored in the microcontroller. When the ground is dry motor on and engine is off in wet weather. This motor state, on and off, is seen on a old. Pv cell photovoltaic cell is a device where light energy is transformed into electricity. Photovoltaic cells are otherwise called solar cells. This is used in complicated and basic applications. Small calculators and wrist watches are the simplest collection of photo voltaic cells in daily use. Most complicated network supplying electricity to pump water, power communications equipment, lights to the homes and run our appliances. This is held as a small grid by the pv cells which take sunlight and convert it into electricity. More generally referred to as photovoltaic, or pv, panels, solar electric panels transform sunlight into electricity.

2. LITERATURE SURVEY

2.1 EXISTING SYSTEM

The existing drip irrigation systems are typically powered by electricity or fossil fuels, requiring external power sources for pumps and controllers. They often rely on manual adjustments and lack integration with renewable energy sources.

2.2 PROPOSED SYSTEM

The proposed system uses solar power to operate the drip irrigation system, reducing reliance on traditional power sources. Solar panels will power the pump and controllers, providing a sustainable, energy-efficient solution for automated, low-maintenance irrigation.

3. BLOCK DIAGRAM

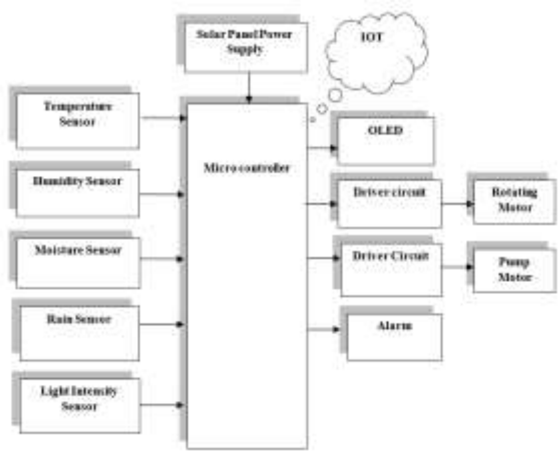

FIG: 1 Block diagram

3.1. HARDWARE COMPONENTS

- Regulated power supply.
- Micro controller.
- Rain sensor
- Moisture sensor
- Temperature sensor

3.2. SOFTWARE REQUIREMENTS:

- Embedded C

4. IMPLEMENTATION

The proposed system is designed to power by solar energy. The charge controller is used between the battery and the solar panel to prevent the power from flowing back to the panel, to regulate the power flow and the circuit will also prevent the battery from being overcharged. The energy is fed from the charge controller into the entire device. The system is further divided into two major units namely control unit and receiving unit.

4.1 Control Unit

The control unit is the heart of the system. It consists of an Arduino UNO which has Atmel320p micro-controller and it acts as the brain of the system thereby controlling all the devices connected to it [12-15]. The YL-69 soil moisture sensor, DHT-11 humidity and temperature sensor, 5V single channel and 12V solenoid valve is connected to the Arduino. The Arduino gets data of the soil moisture content, humidity and temperature from the soil and this data is used to compare with a prefixed threshold value. If the values obtained from the soil do not fall within the designed constrained value, the micro-controller triggers the solenoid valve with the help of the relay connected. Also, this Arduino sends data to the receiving unit through the Nrf24l01.

Receiving unit

This unit consists of an Arduino which receives data using the nRF24l01. This data is later sent to Blynk platform using the ESP8266 module. The architecture of the suggested system is shown in the Fig it mainly consists of control unit and receiving unit as discussed

5 . RESULT

This project is well prepared and acting accordingly as per the initia specifications and requirements of our project. Because of the creative nature and design the id of applying this project is very new, the opportunities for this project are immense. The practical representation of an experimental board is shown below:

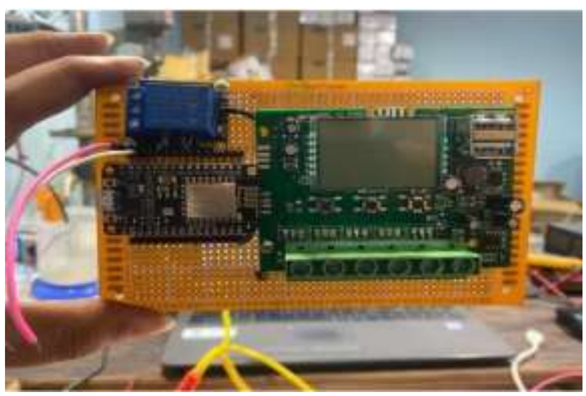

Fig:3. Project Model

6. CONCLUSION

When this program is introduced, the program proposed benefits the farmers. And with solar panel energy also useful to the government, addressing the energy crisis is a challenge. This automatic irrigation system is implemented when soil needs water is indicated by the sensor. Then the various crops also got irrigated by turning on the button with this device. The irrigation system measures the crop's humidity level according to the pressed button. For example, soil moisture content inWheat, Paddy, Sugarcane crops is automatically detected and irrigated. Automatic irrigation system is utilized to maximize water usage by reducing waste and reducing human activity. Solar panel gives the energy needed to the water pump and control system. Small grid solar panels which can generate excess energy. By using solar energy it reduces the issue of the energy crisis. The device needs minimal maintenance and care, as they start themselves. Tracking arrays may be implemented to further enhance the daily pumping rates. This device shows the feasibility and application of using solar PV to provide energy for the sprinkler irrigation pumping demands. While this system needs more investment but after a long run of this system it solves more irrigation problem.

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