REMOTE CONTROLLED & SOLAR POWERED PLANT WATERING SYSTEM

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Abstract- Solar energy has emerged as viable source of renewable energy over the past few decades and is now used for various applications such as emergency lighting, water heaters, and industrial application. It is a cheap source of energy. Unlike hydroelectricity it does not cause national or any conflicts because sun is the only renewable source which is available to everyone. This project proposes a remote operated and solar powered watering system. The main objective is to design an low fuel cost and time based plant watering system with the help of RF signal remote control. This Solar powered and Remote operated watering system project which uses solar energy to get powered and can be controlled by means of RF remote. It is possible to operate from a distance of about 10 feet allowing me to water plants with great ease. This is a wireless medium watering system using RF signals and the most highlight feature is adding to this project is Solar power. This system is powered completely by the Solar power . So in an essence this project uses Solar energy for its working and wireless medium (RF) for its controlling operation. RF remote or transmitter will be with the user where a button press in the remote will activate the water pump. The whole receiver unit is going to be powered by Solar Panel directly without using any batteries. The receiver unit comprises of Under voltage lockout circuit, RF receiver module, controlling unit and water pump. Batteries can be handy but will make this project bulk and costly. A special block called Undervoltage lock out circuit is used for stabilized operation of whole Receiver and pump controller block in this project. The RF receiver will receive the incoming signals from the transmitter decode them and then feed it to the controller block. This in turn will operate the water pump to supply water to the plants.

Keyword: - Drip irrigation, RF remote control, automation

1.INTRODUCTION

Agriculture is the backbone of Indian economy. Conventional methods leads to soil saturation and it stays wet for long time after irrigation is completed. The continuously increasing population in India demands for the rapid improvement in food production technology. The Agriculture sector is the biggest user of fresh water resource, followed by the sectors like domestic and industrial sector. "Subsoil water" contributes to around 65 per cent of the country's total water resource demand, and plays a key role in casting the nation's economic and social development. On the other hand, feeding population of our own country, which is 17 per cent of the world with 4 per cent of world's water resources at hand, is a difficult task. Automation significantly reduces cost of production by systematic usage of energy, labour pool and material. The quality of product can be achieved with automated machines that gives distinctness and processes that cannot be achieved with manual operation is automated; the same quality would be achieved for several crops with little variation.

Agricultural processes, basically, produce quality crop from seeds using water, fertilizers, pesticides, energy, manpower, equipment and infrastructure. Since agriculture is essentially an economic activity, the fundamental objective of any farmer is to make profit by reducing investment, expenditure and manpower and obtaining good quality product. This can be achieved by using to automation.

A site-specific wireless sensor-based irrigation control system is a potential solution to optimize yields and maximize water use efficiency for fields with variation in water availability due to different soil characteristics or crop water needs and site-specifically controlling irrigation valves. Decision making process with the controls is a viable option for determining when and where to irrigate, and how much water to use. An irrigation controller is used to open a solenoid valve and apply watering to plants when the volumetric water content of the substrate drops below a set point. Automatic irrigation scheduling consistently has shown to be valuable in water use efficiency with respect to manual irrigation based on direct soil water measurements.

2. Literature Survey

Title: "Automated Irrigation System Using Solar Power"

Author: Jia Uddin, Dec-22-2012 .

Description:- This paper proposes a model of variable rate automatic microcontroller based irrigation system. Solar power is used for controlling the system. Sensors are

continuously sense the water level and give the message to the farmer informing the water level . Based on the water level, a farmer can control the motor by sending a message from his cellular phone even from a remote place. However, if the water level reaches to the danger level; the motor will automatically start without confirmation of farmer to ensure the proper water level in the site.

Title: "Solar-Powered Automated Plant/Crop Watering System"

Author: Rana Biswas, Romit Beed , January 2015

Description:- This work aims at developing an entirely automated plant/crop watering system. The main motivation behind this system is to conserve the wastage of water It also aims at reducing human labour, effort and errors. It uses solar panels to provide power to the system at daytime and charge the batteries to operate at night. It uses moisture sensors to sense the level of moisture in the soil..

Title: "Solar Automatic Plant Watering System"

Author: Prajwal Kumar J, REPSE-2017

Description:- The solar automatic Plant Watering System works on the principal of conductivity in the soil . New concepts of technology are being developed to allow agricultural automation to enhance the yield of the crops . The aim of the project is to minimize this manual intervention by the agriculturist.

Title: "Smart Irrigation System Using Moisture Sensor and Solar"

Author: Midhun.V. k, Revised: 25/02/2017 ,Accepted: 27/03/2017.

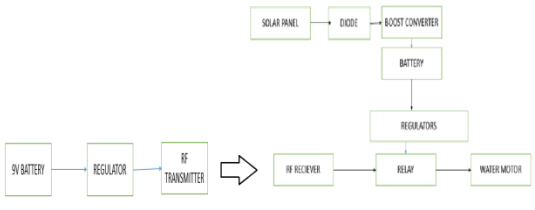
Description:- The project is designed to develop an automatic irrigation system which switches the pump motor ON/OFF on sensing the moisture content of the soil. In the field of agriculture, use of proper method of irrigation is important. The advantage of using this method is to reduce human intervention and still ensure proper irrigation.

Title: "Design and Implementation of a Solar-Powered Smart Irrigation System "

Author: Dr. Esther T. Ososanya, June 14-2017.

Description:- This paper addresses water scarcity and food crisis by designing and implementing a smart Irrigation system. It presents the details of a solar-powered automated irrigation system that dispenses the exact amount of water required depending on the soil moisture, hence minimizing The waste of water.

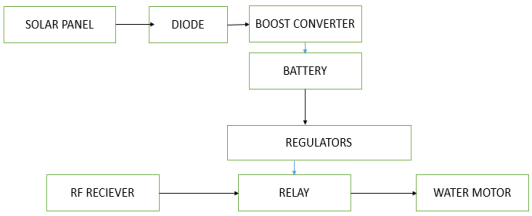
3 BLOCK DIAGRAM:



RF remote will be starting block of this project. This was made to be portable hence allows user to operate at their own ease. Next comes the Solar panel which powers the entire Receiver, Controlling unit and the motor itself and the receiving part is completely Solar powered. The choice of Solar panel is very much important.

Following the solar panel there comes an under voltage lock out circuit which effectively blocks supply to following blocks in case voltage from Solar panel falls below threshold (will be explained in detail below). The Receiver module receives and decodes the signal from transmitter. Once decoded this is fed to the controlling block where depends on the signal input motor is either activated or deactivated.

RECIEVER PART:



These two modules lies in the core of RF control operation of this project. These modules are quite easy to obtain from any local component vendor or via online. If you intend to make one or need an in depth understanding of these RX and TX modules.

TRANSMITTER PART:

Keeping the RF transmitter module as the core we can build the remote for this project easily. To make this portable i intend to power it via battery rather and I choose a 9v battery since it is cheap and offers good lifetime. A push button was interfaced with the AD9 pin of the TX module. Other end of the button is connected to ground since pins of HT12E is active low and will be activated when pressed. A pull up resistor was used to prevent false triggering from the remote.

4- HARDWARE REQUIREMENTS

- RF RECIEVER AND TRANSMITTER
- REGULATOR
- DC WATER MOTOR
- SOLAR PANEL
- BOOST CONVERTER

4.1. RF RECIEVER AND TRANSMITTER

An **RF module** (short for **radio-frequency module**) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. **RF** communications incorporate a **transmitter** and a **receiver**.

They are of various types and ranges. Some can transmit up to 500 feet

4.2. REGULATOR

A **regulator** is a device or mechanism that automatically controls something, such as the temperature in a room or the growth of a person's body. An automatic voltage **regulator** ensured a constant output from the generator.

4.3. DC WATER MOTOR

This is a low cost, small size Submersible Pump Motor which can be operated from a 2.5 ~ 6V power supply. It can take up to 120 litres per hour with a very low current consumption of 220mA. Just connect tube pipe to the motor outlet, submerge it in water and power it. Make sure that the water level is always higher than the motor. The dry run may damage the motor due to heating and it will also produce noise.

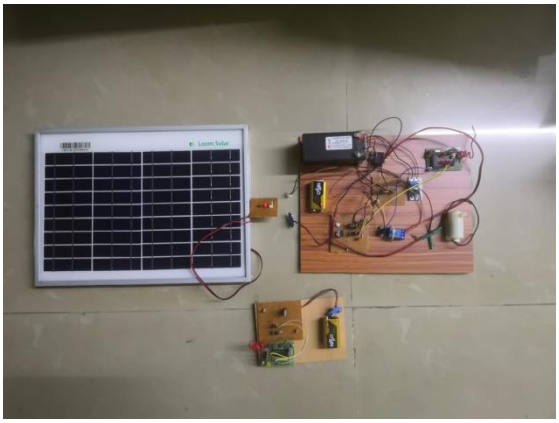
4.4. SOLAR PANEL

A PV module is an assembly of photo-voltaic cells mounted in a frame work for installation. Photo-voltaic cells use sunlight as a source of energy and generate direct current electricity. A collection of PV modules is called a PV Panel, and a system of Panels is an Array. Arrays of a photovoltaic system supply solar electricity to electrical equipment.

4.5. BOOST CONVERTER

A boost converter is a DC to DC converter with an output voltage greater than the source voltage. A boost converter is sometimes called a step-up converter since it "steps up" the source voltage. Since power ( ) must be conserved, the output current is lower than the source current.

6. RESULTS



CONCLUSION

The main objective of this presentation is to design a fully automated drip irrigation system. Using this system, one can save labour pool, fresh water resource to improve production and ultimately enhance profit. In this project, a wireless data accretion network was implemented and applied to irrigate a field (model). The automated system can be proposed to be used in various commercial field productions since it was obtained in economical rates and in reliable operation. This application of sensor based AUTO-AGRI system has some advantages such as preventing moisture stress of crops,

diminishing of extreme usage of water, ensuring rapid growth of weeds and denigrating salinization. If in future, different sensors like temperature and moisture are implemented, it can be said that an internet based remote-control automation of various agricultural field will be possible.

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