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A REVIEW ON SOLAR BASED PLANT IRRIGATION 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. This seminar proposes a solar based automatic irrigation system. The main objective is to design a low cost and time based irrigation system with the help of microcontroller. Irrigation scheduler measures various parameters such as humidity, temperature and soil moisture. In this seminar the spin type solar panel is used. This automatic irrigation system uses alternative energy that drives water pump to pump water from bore well to a tank and therefore the outlet valve of tank is automatically regulated exploitation controller. In this irrigation system the irrigation pump controlled in two modes: Automatic mode and GSM mode.*

***Key Words*: GSM Modem, Irrigation, Solar Panel.**

1. INTRODUCTION

Choice of proper methods is always important in the field of irrigation. Agriculture uses 85% of available freshwater resources worldwide and this percentage will continue to be dominant in water consumption because of population growth and increased food demand. In this era of sensors and technological development there is an urgent need to create strategies based on science and technology for sustainable use of water.

Improving irrigation efficiency can contribute greatly to reducing production cost of crops, making the demand supply response more efficient. Recent technological advances have made soil water sensors available for efficient and automatic operation of irrigation systems. The proposal frees one from manually operating the pump and also the sensor network brings down the wastage of water. To meet the demand for energy, harnessing of non-conventional or renewable energy becomes a necessity. Solar energy is the most abundant and uniformly distributed among all the available non-conventional sources. Automatic irrigation system uses alternative energy that drives water pumps to pump water from bore well to a tank and therefore the outlet valve of tank is automatically regulated exploitation controller. A wet detector is employed to manage the flow of water from the tank to the irrigation field that optimizes the employment of water. Since our country ranks second in agriculture and it receives daylight throughout the year, it's informed utilize solar energy for irrigation functions. The alternative energy is completely excellent for use with irrigation systems for gardens, apartments, greenhouses. Through correct irrigation technologies, average vegetable yields may be maintained or increased. When the condition of water in the plant is seems to be abnormal then the system automatically switches ON the motor. When the water level reaches normal level the motor automatically switch OFF. In this seminar we are interfacing microcontroller through temperature sensor, humidity sensor and also interfacing to GSM In this project we also sense the temperature humidity and the conditioned is uniformly monitored by arduino and stored at server.

1.1 Solar Panel

Solar panels absorb the sunlight as a source of energy to generate electricity or heat. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 365 Watts (W). A photovoltaic system typically includes an array of photovoltaic modules, an inverter, a battery pack for storage, interconnection wiring, and optionally a solar mechanism. The most common application of solar panels is solar water heating systems.

1.2 Battery

Battery is used to store the electricity generated by the solar panels. We are using battery of 12V.

1.3 Voltage Regulator

7805 is a voltage regulator integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. 7805 IC structure can be shown in below fig. 1.3.

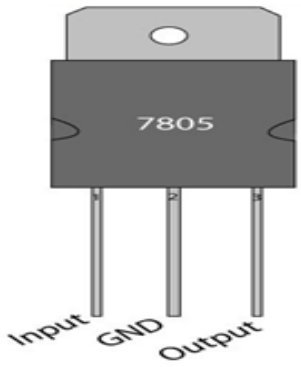

Fig. 1.3: Voltage Regulator

1.4 Microcontroller

The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed.

1.5 GSM Modem

In this system, GSM standards are used as an interface between controller, pump and the cultivator. It has three ports as Tx, Rx and gnd. GSM is nothing but the Global System for Mobile communication. In this system design GSM standards are used as an interface between controller, pump and the cultivator. GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. SIM900A is an ultra compact and reliable wireless module. The SIM900A is a complete dual band GSM solution in a module which can be embedded in the customer applications.

2. BLOCK DIAGRAM

Block diagram description is given below,

2.1 Soil Moisture Sensor

There are quite a few very commonly used and easily available chemical compounds which show changes in their physical as well as electrical properties under the presence of different amount of water present in their amorphous as well as crystalline structure. Soil moisture sensor (sensor LM 35) is used to sense the moisture level of the soil. Soil moisture sensor has four ports A0, D0, GND and VCC. They are directly connected to the controller unit. The sensor measures the dielectric constant of the soil in order to find its volumetric water content (VWC).

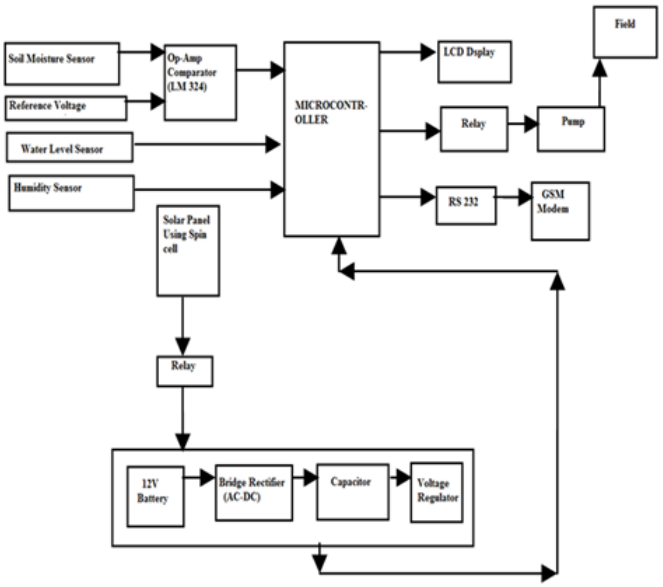

Fig. 2: Block Diagram of System

2.2 Humidity Sensor

Irrigation techniques need accurate moisture content for plants. The humidity detector HS1101, is cost effective solution for measuring relative humidity within + or – 5%. Humidity Sensor is one of the most important devices that has been widely in consumer, industrial, biomedical, and environmental etc. applications for measuring and monitoring Humidity.

2.3 Water Level Sensor

Liquid level sensor measure liquid level in tanks, reservoirs and in the environment, without any moving parts. The sensing probe element consists of a special wire cable which is capable of accurately sensing the surface level of nearly any fluid, including water, salt water, and oils. The sensor element is electrically insulated and isolated from the liquid into which it is inserted and will not corrode over time.

2.4 LCD Display

LCD display is used in this system. In this LCD display shows extended temperature range is available and several character type with LED. When the battery voltage go on top then that time microcontroller commands LCD to battery overcharge.

2.5 Relay

A relay is a sensing device which is useful for detection of fault in the system. Once the battery voltage goes on top of 13.8V the microcontroller commands digital display to Battery over charge can operate the relay in between the solar array and battery and can disconnect the solar array from battery and no additional charging takes place.

2.6 MAX232 IC

The MAX232 is a dual driver or receiver. It is an integrated circuit which converts the signals from RS232 serial port to the proper signal which are use in TTL compatible digital logic circuit. The drive increases the output voltage level from 5V supply to 7.5V by using external capacitor. It is mostly used in voltage level signal problems. This is use as a hardware layer converter like to communicate two systems simultaneously. It is helpful to understand what occurred to the voltage levels.

3. Conclusion

This review is proposed to supports aggressive water management for the agricultural land. Microcontroller in the system promises about increase in systems life by reducing the power consumption resulting in lower power consumption. We designed and implemented this model considering low cost, reliability, alternate source of electric power and automatic control. As the proposed model is automatically controlled it will help the farmers to properly irrigate their fields. The model always ensures the sufficient level of water in the paddy field avoiding the under-irrigation and over-irrigation. Farmers can remotely ON/OFF the motor by using cell phone even from away. The system is secured with password for the restricted number of users. Solar power provides sufficient amount of power to drive the system. To overcome the necessity of electricity and ease the irrigation system for our farmers, the propose model can be a suitable alternative.

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