Automatic Smart Solar Irrigation System for Agriculture

Gohil Sujay[1] Chavda Aradhna[2] Kargatiya Jagadish[3] Virani Darshna[4] Prof K. M. Solanki[5]
[1,2,3,4]Student [5]Assistant Professor
[1,2,3,4,5]Department of Electrical Engineering
[1,2,3,4,5]Dr. Subhash Technical Campus, Junagadh, Gujarat, India

Abstract— Farming systems are defined by the patterns in time and space in which producers grow their crops; the management decisions regarding the inputs and production practices used; the management skills, education, and objectives of the producer. The quality of the soil and water; and the nature of the landscapes and ecosystems within which production takes place. The production practices used to grow crops impinge on an agro ecosystem made up of complex interactions among soil, water, biota, and the atmosphere. The interactions among the farming systems and the soil, water, biota, and atmosphere determine the effects those farming systems will have on soil and water quality.

Key words: Solar Irrigation System, Agriculture

I. Introduction

The aim of the implement was to demonstrate that the automatic smart irrigation can be used to reduce the water use. To avoid the manually operated system micro controller based system has been proposed in his project. This system also helps the farmer to find their soil fertility.

In this project also used humidity sensor to identify humidity of the soil whereas this senses automatically water will pumped to certain field. The system has a distributed wireless network of soil-moisture and temperature sensor placed in the root zone of the plant. In addition the controller collects the data from those sensor and send to PLC.

An automated irrigation system uses electricity which drives water pumps to pump water form water sources bore well to storage tank and the outlet valves of tank is regulated automatically by PLC, controller and sensors. This technique optimizes the use of water for irrigation purpose. The irrigation control to farm can be given depending upon to the temperature and moisture need of the surrounding as measured by temperature sensors and humidity sensors.

II. Literature Survey

Present invention provides a horticultural system. It consists of soil moisture sensor and a gravimetric sensor, level sensor, container. Sensor means are located in said reservoir to measure the volume of liquid in said reservoir and a second sensor means in said reservoir measures the electrical conductivity of liquid in said reservoir.

The need for more effective management of Water resources is becoming an ever increasing priority. Automatic Watering systems for container horticulture typically operate a fixed time scheduling, with generally no feedback as to whether the potting mix actually needs Watering at the time the Watering system comes on. Sensors of soil moisture can provide quantitative feedback as to When Water is needed, and evapotranspiration (ET) based irrigation controllers have also been shown to provide significant water savings.

III. Block Diagram

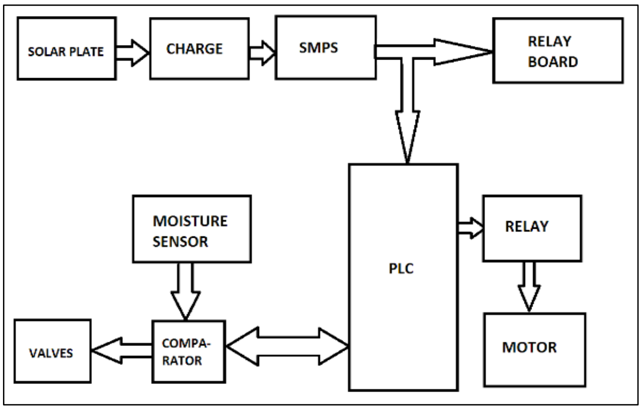

Fig. 1: Block diagram

An irrigation method that saves water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing. It is done through narrow tubes that deliver water directly to the base of the plant. The moisture sensor unit senses the moisture and temperature sensor unit senses level in the soil. It gives a digital signal to PLC determining whether the fields to be watered or not. The mobile and the microcontroller are connected.

The water level sensor is used to determine whether level in storage tank is sufficient or not for watering the field. If water level storage is low in well indication is on and signal going to PLC reading as less resource so, watering not complete otherwise the indication is water complete filed. The water level is sufficient; all sensor continuously check the surrounding condition of a filed whenever the requirement of water tank is sense by the sensor at that time controller will be turn ON the water pump.

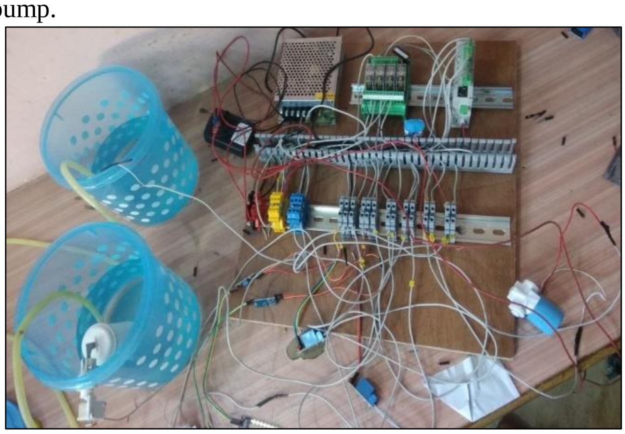

Fig. 2: Running Model

The PLC is connected to soil moisture sensor through the solenoid valves (control valves). The soil moisture sensor takes a reading of amount of water present in the soil and uses the information to open or close the control valves. So, sensor in stream one is senses the requirement of water at that time solenoid valve is ON for this crop stream. If the soil is dry the soil moisture sensor senses this condition and sends command to plc to open the control valves and thus the dripping process starts. If the soil is wet the soil moisture sensor senses this condition and sends command to plc to close the control valves and thus the dripping process stops.

After that the requirement of water is done in stream one at that time the sensor again senses the there is no need of water. Hence controller will be turned OFF solenoid valve. Overhead tank is used to supply water throughout the field. .It senses two levels, high level & low level. When it senses water at low level it passes signal to sensor sends signal to 12v relay the output generated by this relay is fed as input to plc generates an output and 24v relay turns on the motor As soon as detects the water in overhead tank at high level the motor is turned off.

IV. Component Description

A. *Solar plate*

Photovoltaic modules use light energy (photons) from the Sun to generate electricity through the photovoltaic effect. The majority of modules use wafer-based crystalline silicon cells or thin-film cells. The structural (load carrying) member of a module can either be the top layer or the back layer. Cells must also be protected from mechanical damage and moisture. Most modules are rigid, but semi-flexible ones based on thin-film cells are also available.

The cells must be connected electrically in series, one to another. Externally, most of photovoltaic modules use MC4 connector's type to facilitate easy weatherproof connections to the rest of the system.

B. *Moisture sensor*

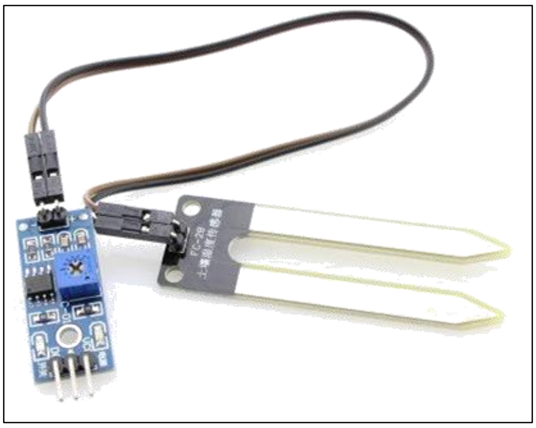

Fig. 3: Moisture sensor

Soil moisture sensors measure the volumetric water content in soil. 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.

C. *Automatic valve*

Fig. 4: Valves

The valve is controlled by an electric current through a solenoid: in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold.

Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the materials used, low control power and compact design.

Besides the plunger-type actuator which is used most frequently, pivoted-armature actuators and rocker actuators are also used.

Acknowledgement

We would like to sincerely thank my Guide Prof. K. M. Solanki For his constant encouragement and support throughout my paper work. They always ensure that my work is being held in proper direction and always guided me in planning work at each stage of my work. We take this opportunity to express sincere appreciation and deep sense of encouragement, which had a great influence in bringing this project to success. We remain ever indebted to him for the keen interest shown and moral support offered all through pursuance of this work.

Reference

[1] https://onlinecourses.nptel.ac.in/noc17_ec08 /preview
[2] https://www.electricaltechnology.org/2015/0 9/scada-systems-for-electricaldistribution.html
[3] http://electrical-engineeringportal.com/download-center/books-andguides/automation-control/study-plc (An Industrial training report – Study of PLC – Mr. Sonu Kumar Yadav, B-Tech 3rd yr, Electrical Engg.)

