

Plc Based Automated Drip Irrigation

Santosh¹, Sanket², Shriyo³, Sugandha⁴, Sakina⁵, Priyanka harsha⁶, Anuradha Desai⁷

^{1,2,3,4,5,6,7}(student, K.L.S.'s Shri Vasantao Potdar Polytechnic, Belgaum, India,)

²(Senior Scale Lecturer, HOD, Department of CS, K.L.S.'s Shri Vasantao Potdar Polytechnic, Belgaum, India)

Abstract:

Drip Irrigation is a progressing technology in the field of Agriculture and irrigation. 'Drip irrigation, is 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, and emitters. Use of automated drip irrigation we can save more water & increase our economy by increasing production with less man power. The major part of agriculture is the efficient use of water for irrigation, where it is not feasible to implement full scale evapotranspiration based irrigation controller. During the growth season crop water does not remain constant and varies depending on the canopy, climate conditions such as temperature, wind, relative humidity and solar radiation. Thus, it is necessary to find an economic irrigation controller that can adapt the daily water application as per the plants requirement. Due to development of programmable logic controller (PLC) and their affordable price has made it possible to use them as stand-alone irrigation controllers. This work aims to develop the automated drip irrigation using plc for monitoring and managing the agriculture field. This project is concentrated on the agricultural system that can be used to monitor and control the agricultural field. Observations by implementing this project work shows efficient use of water to crops, improvement in Losses due to animals/wild animals, proper usage of pesticides in the agricultural field.

Keywords : drip irrigation.

I. Introduction

Agricultural and irrigation fields are based on one of the most precious natural resources water. Irrigation controllers have been developed for automatically controlling application of water to landscapes. Known irrigation controllers range from simple programmers that control application depth based upon fixed schedules, to sophisticated devices that vary the watering depth according to Climatic data obtained from expensive weather stations. 'Drip irrigation, is 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, and emitters.

It is done through narrow tubes that deliver water directly to the base of the plant. A PLC is a control system that continuously monitors the state of input device & makes decision based upon the custom program to control the state of output devices. PLCs are "Programmable Logic Controllers" that are being used extensively in manufacturing processes.

As already mentioned the aim of this research is to develop an economical PLC based irrigation controller that automatically adapts the application depths to actual weather conditions, using simple sensors and then carries out the irrigation accordingly. In this project we are implementing Automatic drip irrigation by sensing the Moisture of the soil, Fire detector, Water level sensor, Intruder, Vegetable washer, Fertilizer.

II. System Design

'Drip irrigation, is 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, and emitters. It is done through narrow tubes that deliver water directly to the base of the plant.

III. Moisture sensing

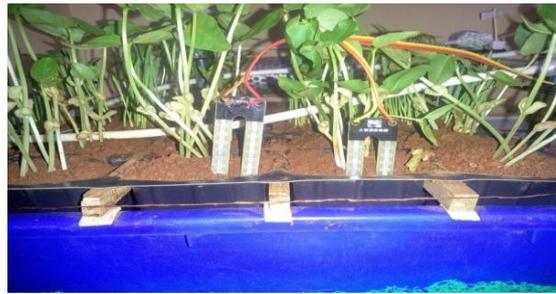


Fig:4.1 Moisture Sensor

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.

The dripping of water is based on the two condition as follows

- 1) 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.
- 2) 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.

IV. Water level sensor



Fig:4.2 Water Level Detection

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 IC 4093, this IC sends signal to 12v relay, the output generated by this relay is fed as input to plc. PLC generates an output and 24v relay turns on the motor. As soon as IC 4093 detects the water in overhead tank at high level the motor is turned off

V. Intruder



Fig:4.3 intruder

If any animal tries to get in the field for grazing and harming crops, there is a leaf switch placed on borders of field, if animals tries to enter, the leaf switch triggers IC 555 timer and this timer turns ON the buzzer and hence alerts the farmer.

VI. Fire detector



Fig:4.4 fire detection

Due to any mishap if the field catches fire, thermistor (temperature) sensor detects change in temperature its sends signal to IC 555, this IC sends signal to plc and plc generates an output which turns on motor and water starts sprinkling over the entire field. When the temperature goes low the motor is automatically turned off.

VII. Vegetable Washer



Fig:4.5 vegetable washer

A toggle switch is placed, when it is turned ON the PLC generates two output one for solenoid valve one for motor. The farmer has to insert vegetables in the washer, the solenoid valve supplies water and the motor rotates the washer. Thus the vegetables are washed.

VIII. Fertilizer



Fig:4.6 fertilizer

There are chances of crops getting destroyed due to harmful insects. To take precautions the farmer has to put fertilizer throughout the field, he turns on the switch & the fertilizer starts flowing through solenoid valve towards entire field.

IX. Result analysis

- Moisture sensing senses the requirement of water to be dripped at the particular time by this work it is observed that the time required to drop water is efficiently used.
- Water sensor senses the water level in the overhead tank and fills the tank as per requirement. Thus the farmer need not check conditions of tank always.
- Leaf switch present on all four corner of the fencing done around field alerts farmer that any intruder is entering hid field. He can thus prevent this.
- Fire detector is placed into field when the sensor senses rise in the temperature it turns on the sprinkler. This saves huge loss as farmer cannot keep watching field all the time and soon as temperature goes down sprinkler turns off.
- Fertilizer tank is placed and whenever farmer wants to put fertilizer he puts on manual switch and fertilizer is flows in the in entire field and saves manual power.
- A washer used to wash all the vegetables and makes them clean and market ready for use.
Atomizing drip irrigation can save up to 70% of water. Manual power cannot take care of all things thus automation saves manual power, time and ensures profit rather than the loss. Productivity is increased and PLC is efficient , reliable, less maintenance cost and one time expenditure.

X. Conclusion

In this project work, we observed that the drip irrigation would bring revolution in farming techniques. 70 % amount of water is saved, improves quality, increasing productivity of crops, making irrigation productive and automated .Washer cleans the vegetables automatically by using PLC.

References

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