

Automation in Agriculture Using PLC

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ABSTRACT: This was when people use the traditional method for agriculture irrigation. Over the thousands of year man used to irrigate over the traditional method. Because of this people didn't assure the highest output from the crop. The structured design of the system in which we can able to output the highest output from the system. Automation changes the world. Look back towards the decade, we have seen that the various process industries are changing with the automation. Rate of growth is increasingly using automation techniques.

KEYWORDS: Automation, PLC, Agriculture, Irrigation

I. INTRODUCTION

In day to day life, we go to modern life but some the people remain in that position likes a farmer. Agriculture is totally based farmers and in our country 60 - 70 % area under in agriculture. Due to bad weather, we are not able to make full use of agriculture assets. The main problem that is face farmer was the lack of rains in many parts of India. Other manual problem like the delay of water supply, water consumption, insufficient fertilizer consumption etc. In agriculture using an automatic technique like an automatic drip system. In our technique sensors sense the soil moisture also check the temperature also preparation of fertilizer so due to this we are increasing the in-crop production, quality and also reduces the labour work.

II. PROPOSED SYSTEM

The overall structure of our system based on PLC is shown in the following figure.

In our system, we have used a PLC, which is Allen Bradley series B, which acts as a main controller of the system. The main objective of the PLC is to take the input from the different sensors which we are using in the system and then generate output based on the logic given in the program we are using PLC because PLC has faster response compared to the microcontroller and has long operating life. The programming in the PLC is easy compared to other controllers. The languages used for PLC are 1. Ladder diagram 2. Structured text 3. Function block diagram.

The ladder logic is quite easy and simple to develop and understand the program. In this system, we are using two motor one for pumping water and another for fertilizer spraying. Both the motors operate in the single-phase nominal ac voltage and are controlled by the PLC using the relay system. In this system, we are using contactors type of relays. It is based on energizing signal from PLC either turn ON or OFF.

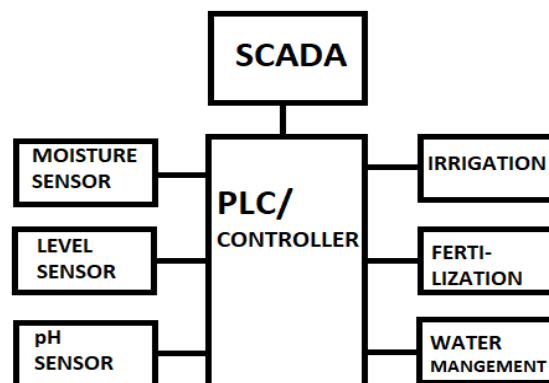


Fig.1 input-output configuration with PLC

In our system motor are used for water pumping and another motor is for a drip system. These motors are operating on single phase nominal ac voltage these controlled by PLC. Soil moisture sensor measured the water content in the soil. The direct gravimetric measurement of free-soil moisture requires removing, drying. Etc

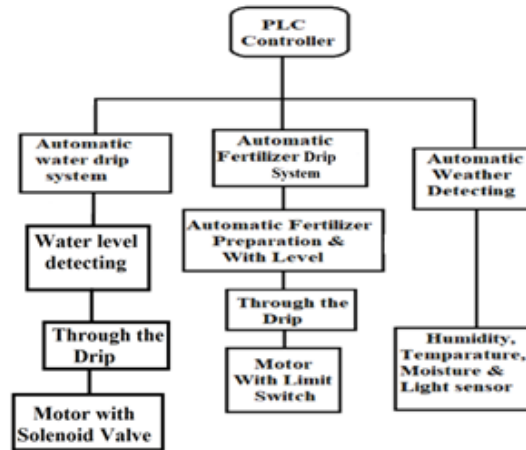


Fig.2 Layout dig of the Controlling Unit

III. METHODOLOGY

i. Automatic Water Drip System

The pump carries water from the well the water flows through the pipe which divides the field into two parts and is supplied to the field. one valve is used to control the water supply on one side of the field and another valve on the other side of the field the operation of the base of the valve on time or volume controlled by using PLC the pump carries water from the well the water flows through the pipe which divides the field into two parts and is supplied to the field. one valve is used to control the water supply on one side of the field and another valve on the other side of the field the operation of the valves base on time or volume controlled by using PLC.

ii. Fertilizer Supply

Fertilizers are supplying with their requirement. This process is controlled by PLC. Fertilizer carrier pipe connected with mainline to supply the fertilizer with water. Which helps to supply the fertilizer up to the tip of the root? Fertilisation totally depends on the weather and crops condition.

iii. Automatic Weather Detection

Climate change can disrupt food availability, reduce access to food, and affect food quality. For example, projected increases in temperatures, changes in precipitation patterns, changes in extreme weather events, and reductions in water availability may all result in reduced agricultural productivity. This system will ensure the weather condition and give the inputs to the SCADA system. According to the program, there will be changes in water irrigation & fertilization.

IV. COMPONENTS

i. Relay:

A relay is electrically operating the switch. It is an electrical control used for electrical power circuit. It consists of the set of input signals and controls the circuit which has a low power signal. The relay comes in varying capacities with its own features. The working range of relay is 24v DC. The relay is small, which is picking up in one hand. The relay is used to control the motors, capacitor banks and other electrical loads. The relay is used for safety purpose.



Fig.3 Solid State Relay

ii. Soil Moisture Sensor

The moisture sensors are connected to the PLC moisture sensor requires 5V supply. It measures the volumetric water content which is present in the soil. The output voltage depends on the conductivity of soil, which is directly dependant on the wetness of the soil. This output voltage for the dry soil state to completely wet soil state ranges from 0.05v to 3.35v. Then these voltage values are connected integer values inside the PLC.

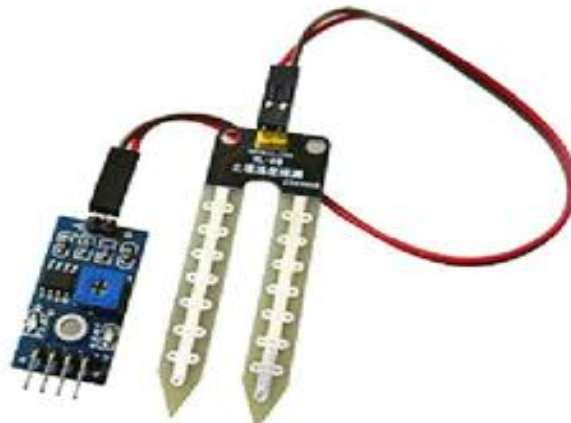


Fig.4 Soil Moisture Sensor

iii. Pumping Motor:

An electric motor converts electrical energy into mechanical energy. In our project motor use as apumping device. The motor works on 3-6 dc voltage. It flows 60-100 lit water per hour at a height of 1 meter.



Fig.6 Pumping Motor

iv. Humidity Temperature Sensor:

This is the device which is used for measurement of temperature and humidity. Gives the humidity range from 20% -90 % RH and temperature ranges from 0-50⁰C. It can easily. Configure with the controller. It works on the 5v DC voltage.

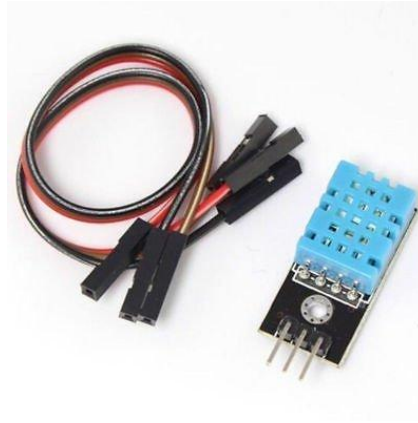


Fig.6 Humidity Temperature Sensor

V. CONCLUSION

Electrical automation for agriculture is the small contribution for the farmer. Project model can be used for large scale tree plantation over the acres of area. There are lots of lots of advantages which are like water-saving, growth regulation of plant, proper fertilizer feeding to the plant. One-time investment gives lots of profits to farmers.

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